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Wetland protection: the role of Iowa agencies in the implementation of federal and state programs

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INTRODUCTION

When European settlers first arrived in the United States approximately 215 million acres of wetlands existed in the coterminous, or lower 48, states. At the present time, only 100 to 106 million acres remain. This destruction and alteration continues today, with an annual loss of nearly 300,000 acres (Tiner 1984).

In the state of Iowa, roughly 2.3 million acres of natural marshes existed in the 1780s (Bishop 1982:223). The conversion of these natural areas for other uses, primarily agriculture, has resulted in a loss of 99%. According to Lee Gladfelter (1991) of the Iowa Department of Natural Resources, only 35,000 acres of 'true' wetlands, prairie potholes and marshes, now remain.

In the past, government itself has provided the impetus for this drastic loss. The federal Swamplands Acts of the mid-19th century, followed by similar acts at the state level, awarded nearly 65 million acres of wetlands to private landowners. In addition, a host of subsidies and programs for farmers and developers actually encouraged the draining and filling of wetlands. Some of these incentives are still in place, contributing to the ongoing rate of loss. This is not an indictment against these government actions, they simply reflect the prevalent public attitudes of the time toward wetlands, which were seen as breeding grounds for disease-laden insects and as wastelands which should be altered for more useful purposes.

The national attitude towards wetlands has changed dramatically in recent decades. Wetland areas are now widely recognized as the precious natural resource that they have always been. They are some of the most productive ecosystems on the North American continent, providing habitat for a variety of fish and wildlife. Wetlands also have tremendous ecological significance, purifying water, controlling erosion, and recharging groundwater supplies. They also provide a host of socioeconomic benefits, such as offering recreational and educational opportunities, holding stormwater to prevent flooding, naturally treating wastewater, and producing natural commodities.

In its efforts to keep pace with this changing public perception, Congress has passed several federal laws, each covering a different aspect of wetland protection and involving several administrative agencies. The most significant pieces of environmental legislation related to current wetland regulatory efforts are the Clean Water Act (CWA) and the 1985 and 1990 Food Security Acts, commonly referred to as the Farm Bills. The result of this legislation is the involvement of many separate federal administrative

agencies. The CWA alone authorizes joint jurisdiction over wetland-related activities to the Army Corps of Engineers (in the Department of Defense) and the Environmental Protection Agency (EPA); it also gives advisory and consulting roles to the Fish and Wildlife Service (in the Department of the Interior) and the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration. The Soil Conservation Service and the Agriculture Stabilization Conservation Service (both in the Department of Agriculture) are involved with implementation and enforcement of wetland provisions under the 1985 and 1990 Farm Bills. Each of these agencies is charged with different roles and responsibilities in protecting the country's remaining wetlands.

In addition to these Congressional efforts, there are numerous other attempts to reverse the nation's historical trend and to preserve and protect what remains of our wetlands. Examples are state and local legislation, administrative programs at all government levels, and critical judiciary decisions. Private conservation groups, like Ducks Unlimited, and special interests, such as farmers and developers, are also involved. This involvement by so many actors with different agendas and overlapping jurisdictions has produced much conflict and confusion for both the public and private sectors. Several authors have referred to the current state of affairs as a "morass," a word which originally meant a tract of low, soft, wet ground, but is now used more commonly to describe any entangling or troublesome situation.

This paper is primarily descriptive in nature, beginning with an elaboration of the issues and ideas presented briefly above: wetland types and definitions, estimations of what has been lost, and their functions and societal benefits. Next, the historical, legislative, judicial, and regulatory framework that has evolved from the federal government's intervention with wetlands is outlined. The study then discusses intergovernmental relations, especially between the federal and state governments, in the administration of wetland protection activities.

A primary focus of the chapter on intergovernmental relations is related to selected provisions of the Clean Water Act. This Act gives the Army Corps of Engineers (the Corps) authority to grant permits for the dredging and filling of the "waters of the United States," commonly referred to as the "Section 404" process. The Act also expanded the definition of waters of the United States to include " . . . isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not

part of a tributary system to interstate waters or to navigable waters of the United States, the degradation or destruction of which could affect interstate commerce." Section 404(g) is a provision for what is usually called the "assumption process," which allows each state to assume authority from the Corps over the issuance of dredging and filling permits within that state's boundaries. In 1984, the state of Michigan assumed full authority of the permit process; as of this writing, it remains the only state to do so. New Jersey is currently involved in the assumption process. Several states are considering it, while others have considered and decided against it. Section 401 of the Act also involves the states in implementation of the CWA by granting all states review and certification authority over any federal license or permit that may result in a discharge into the nation's waters, including wetlands.

A recent report prepared by the Wetlands Division of the EPA, "Study of State Assumption of the Section 404 Program," offers additional guidelines to assess a state's role in wetland protection and regulation. The presence and scope of its existing statutes, the status of current wetland acquisition and restoration programs, the existence of an active Section 401 program, experience in pursuing assumption of Section 404 or a State Program General Permit, and state relationships with the district Corps and regional EPA offices are offered as measures of a state's involvement in regulating wetlands. One of the principle findings of this study was that each state should determine, on an individual basis, how best to move toward having greater authority over their respective wetlands. They cite critical differences in each state that support this position, such as past consideration of Section 404 assumption, the political climate, the value and acreage of wetlands, the volume of permit applications, and the level of current wetlands activities.

There are numerous additional reasons for evaluating the future of wetland protection on a state-by-state basis. States vary tremendously in the types and amounts of their wetlands, the extent and scope of existing legislation, relations with the national and regional EPA and Corps agencies, state definitions of wetlands, the intensity of opinions on property rights, the level of public awareness and support, past land use policies, and local roles in wetland protection.

Because of these compelling reasons, and due to the variety of recent and forthcoming changes in federal and state wetland programs, the main thrust of this thesis is to use the national context to critically examine the past and current role of

Iowa state agencies in the implementation of wetland protection programs, and to make specific recommendations for Iowa's future role.

To achieve this, chapter five begins with important background information, including regional characteristics, Iowa's historical activities, wetland losses, current amounts, wetland types, and some of the native species which are wetland-dependent. Past and present Iowa wetland protection efforts, both regulatory and acquisition programs, are highlighted next.

One emphasis of the regulatory efforts in the state relates to selected provisions of the Clean Water Act. Because of the state's intimate connection with agriculture, Iowa's role in executing the swampbuster provisions of the Farm Bills is also noted. Acquisition programs include Iowa's participation and role in programs initiated by the federal government, state programs, and other projects involving state, local, and private groups.

Other factors influencing Iowa's future role are then discussed, such as the state's political climate, related environmental laws, the level of public awareness and support, the intensity of opinions on property rights, and local roles in wetland protection. This overview also addresses related issues of minimizing duplication between agencies, easing implementation and quickening service delivery, making more informed decisions, and state relationships with other government levels.

The concluding chapter outlines specific conclusions and recommendations regarding state agencies in Iowa and their future role in wetland protection efforts.

WETLANDS

Definitions and Concepts

The word "wetland" evokes different images for many people. By hunting waterfowl, seeing standing water or certain wetland plants, or literally getting their feet wet, each person develops a personal definition of a wetland. Many terms for describing these areas have been used for centuries, including marsh, swamp, bog, prairie pothole, fen and slough. It is only in the last forty years that attempts have been made to group these disparate units under the single term wetlands. Because the reasons and needs for defining wetlands vary, a proliferation of definitions have been developed over time. This section will make a distinction between: ecological, scientific classifications of wetlands, and jurisdictional definitions for implementing legislation.

Ecological Classifications

At the largest and most general level, wetlands of the United States can be divided into two major groups, coastal (or tidal) and inland (nontidal) wetlands. Tidal wetlands include coastal marshes, mudflats, and mangrove swamps, characterized by periodic flooding from ocean-driven tides. Coastal wetlands have long been recognized as sensitive and highly valued areas, leading to stronger protection measures than for nontidal wetlands. Nontidal wetlands are beyond tidal influence and comprise a complex assemblage of inland wet environments including freshwater marshes and ponds, shrub swamps, bottomland hardwood forests, wooded swamps, and bogs. Nontidal wetlands comprised about 94 percent of the wetlands in the coterminous United States in the 1970s (Tiner 1984:28). Because their vulnerability to destruction or alteration is higher, nontidal wetlands will be highlighted throughout this paper.

In 1979, the Fish and Wildlife Service (the Service) published *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin), which uses a scientifically based and multidisciplinary approach to cover the many varieties of wet habitats found in this country. In the years since its publication, it has become the national standard for identifying and classifying wetlands (Burke 1988:1).

Wetland systems form the highest level of this hierarchy; five are defined-Marine, Estuarine, Riverine, Lacustrine, and Palustrine. Each system is then divided

into subsystems, with classes forming the lowest hierarchical level. The Marine system consists of the open ocean overlying the continental shelf and its coastline. The Estuarine system includes both estuaries and lagoons; it is more influenced by its association with land than is the Marine system. The Riverine system includes wetlands and deepwater habitats contained within a channel, with two exceptions: 1) wetlands dominated by trees, shrubs, persistent emergent vegetation, or lichen, and 2) habitats with water containing ocean-derived salts in excess of 0.5 percent. The Lacustrine system includes permanently flooded lakes and reservoirs, intermittent lakes, and tidal lakes with ocean-derived salts less than 0.5 percent.

The Palustrine system encompasses the vast majority of the country's nontidal wetlands. This system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. Shallow, open-water bodies with a depth of less than 2 meters (6.6 feet) are also considered nontidal wetlands. (The Service defines water bodies deeper than 2 meters as deepwater habitats.) Three major types are common: scrub-shrub wetland; forested wetland; and emergent wetland.

Scrub-shrub wetland These freshwater wetlands are dominated by woody vegetation less than 20 feet tall that occur widely throughout the nation. They are commonly referred to as bogs, pocosins, shrubcarrs, or shrub swamps, in different parts of the country.

Forested wetland Forested wetlands occur mostly in Alaska and the eastern United States. They are dominated by trees or woody plants 20 feet high or taller. In the East, they are the most abundant type of nontidal wetland.

Emergent wetlands Wetlands dominated by herbaceous, or non-woody, vegetation, including grasses, cattails, rushes, and sedges, are emergent. Depending on the region of the country and individual attributes, these wetlands are commonly called marsh, wet meadow, fen, or prairie pothole. Emergent wetlands can be found in many differing situations, including along the margins of rivers and lakes, in seepage areas, in saturated permafrost areas of Alaska, and in isolated depressions surrounded by upland such as those found in the Prairie Pothole region of the Dakotas and north-central Iowa.

Jurisdictional Definitions

In 1953, one of the first attempts to develop a wetland classification system was prepared by the Fish and Wildlife Service to serve as a framework for a national inventory. The inventory was conducted to assess the amount and types of remaining waterfowl habitat. The inventory results and a description of the 20 wetland types were published as the Service's *Circular 39* (Shaw and Fredine 1956). The circular became widely used in the struggle to preserve wetlands, but had several shortcomings (Cowardin 1979:2). The classification system ignored critical ecological differences and placed dissimilar habitats in the same category with no provisions for distinguishing between them. According to Cowardin, the most important disadvantage was the inadequate definition of types, which led to inconsistencies in application.

In 1974, the Service directed its Office of Biological Services to conduct a new National wetland inventory. Because of the weaknesses in *Circular 39* , the numerous other classifications and definitions that were developed after its publication, and the increased understanding of wetland ecology, a new National classification was constructed as the first step toward the new inventory. As noted above, *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin 1979) uses an ecologically based, multidisciplinary approach to encompass the wide varieties of wet environments found in the United States, and is used as the national standard for identification and classification of wetlands. The problems associated with wetland definitions are acknowledged explicitly in the statement that "there is no single, correct, indisputable, ecologically sound definition for wetlands, primarily because of the diversity of wetlands and because the demarcation between dry and wet environments lies along a continuum" (Cowardin 1979:3). The Service's definition of wetlands incorporates what is referred to as the "multiparameter approach," which acknowledges three essential characteristics (parameters) used for identifying a wetland: 1) the presence and movement of water at the site (hydrology); 2) a predominance of plants suited for wet environments (hydrophytic vegetation); and 3) soil or substrate that is at least periodically saturated with water (hydric soils).

In the early 1980s, the Environmental Protection Agency (EPA) and the Army Corps of Engineers (the Corps) were involved in developing wetland delineation manuals for administrative purposes of their respective agencies (see chapter 3 for a presentation of the enabling legislation). William Sipple, chief ecologist in the EPA's

wetlands division, describes the efforts of the EPA and its relationship to other federal agencies in a recent article (Sipple 1992). In an early draft in April 1981, the EPA manual provided diagnostic environmental characteristics for hydrology, soils, and vegetation as well as a technical approach for identifying and delineating wetlands: "Evidence of a minimum of three positive indicators, at least one from each of the three parameters . . . must be found before a positive determination can be made." This marked the first time that the multiparameter approach (MPA) was formally presented as a technical standard. A January 1985 draft included this mandatory MPA, but also introduced the concept of atypical situations, such as when vegetation has been purposely or inadvertently removed or altered, or not yet present in recently created wetlands. The March 1986 draft added a section on problem areas, which were "wetland types in which wetland indicators of one or more parameters may be periodically lacking due to *normal* seasonal or annual variations in environmental conditions that result from causes other than human activities or catastrophic natural events [e.g., seasonal wetlands]" (Sipple 1992:5). The July 1986 draft retained the concepts of atypical and problem areas, but referred to technical guidelines instead of technical standards. Since guidelines are generally less constraining than standards, the intent of this change was to allow for more regulatory flexibility. In 1987, an interim final manual was produced. Sipple states that from the beginning, EPA's wetland delineation guidance was never a strict MPA, but was basically hierarchical in nature.

The Corps of Engineers published their *Wetlands Delineation Manual* in 1987 as a final report (Environmental Laboratory 1987). The manual also incorporated the multiparameter approach, with exceptions for atypical and problem areas. The Corps, however, never made the manual mandatory. Its preface clearly states that the manual "is not intended to change appreciably the jurisdiction of the Clean Water Act as it is currently implemented."

In the mid-to late 1980s, the Corps and the EPA had discussed the possibility of combining their two manuals into one for implementation of the Section 404 permit program. The Soil Conservation Service (SCS) of the Department of Agriculture and the Fish and Wildlife Service had also developed wetland jurisdictional definitions, and so agreed to participate in the process (see Figure 1 for a comparison of agency definitions).

Organization (Reference)	**Wetland Definition**
U.S. Fish and Wildlife Service (*Classification of Wetlands and Deepwater Habitats of the United States*, 1979:3)	"Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."
U.S. Army Corps of Engineers [33 CFR section 328.3(7)(b), 1992:484]	Wetlands are "those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." (NOTE: This is the federal regulatory definition used by the Corps and the EPA for administration of the Section 404 permit program.)
Soil Conservation Service, Dept. of Agriculture [16 USC section 3801(a)(16), 1992:146-147]	Wetlands are defined as areas that have "a predominance of hydric soils that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions, except lands in Alaska identified as having a high potential for agricultural development and a predominance of permafrost soils." (NOTE: The Emergency Wetlands Resource Act of 1986 contains this definition *without* the exception of Alaska.)

Figure 2: Selected federal wetland definitions

The Federal Interagency Committee for Wetland Delineation (the Committee) was formed in 1988, with three representatives from each of the four federal agencies involved with wetland identification and delineation. After what is described as "a series of rather arduous meetings" (Sipple 1992:4), a modified federal manual was produced on January 10, 1989. The *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* makes very clear that "*the term 'wetland' as used throughout this manual refers to jurisdictional wetlands for use by Federal agencies*" [original emphasis] (Federal Interagency Committee for Wetland Delineation 1979:1). Its purpose was to provide a single, consistent approach for identifying and delineating wetlands from a multi-agency federal perspective. The manual states that the three technical criteria specified are mandatory and must all be met for an area to be identified as a wetland. It is indicated elsewhere, however, that the intent of this statement was not to require indicators of all three criteria in all instances. Sipple states that in some circumstances, this would prove either impossible to accomplish, impractical, or even unnecessary.

It was hoped that the use of a consistent approach by all federal agencies would eliminate many of the problems associated with regulating wetland-related activities. Unfortunately, after it became effective in March 1989, "substantial controversy, misinformation, and misunderstanding soon surrounded it" (Sipple 1992:5). As a result, the Committee met several times to revise the manual. Several legitimate drafts were produced between October 1990 and February 1991. Sipple resigned from the Federal Interagency Committee in February 1991, because the committee was being instructed to modify its science to fit a new policy mandate. In August 1991, George Bush announced his administration's new wetlands policy, which included relaxing the standards set in the 1989 manual. These proposed revisions have stirred up more conflict than the original manual, and the issue is yet to be resolved. The major point of contention involves the parameter of hydrology; the administration's proposal would extend the amount of time an area must be inundated or saturated with water to be classified as a wetland.

It seems clear that the proposed revisions are based more on politics than on science. The biggest push for relaxing the standards established in the 1989 manual has not come from the agencies involved with wetland protection in this country, but from the Council on Competitiveness. This is an economic advisory council to the Bush administration, headed by Vice President Quayle, which was established to help

relieve the burden of federal regulations on business. The council cannot legally rewrite regulations, but its spokesman, Jeff Nesbit stated: "It's fairly well established that the council had a very active role on the wetlands issue" (Pins 1991:2J). The 1989 manual has been criticized by farm groups, developers, and oil and gas interests as being overly broad, stopping development projects, and preventing farmers from exercising their private property rights, leading the council to recommend relaxing the standards.

Field tests were conducted by the Corps, the Service, and the EPA to determine the results of implementing the proposed revisions, but the Bush administration placed a gag order on the agencies to repress their findings. Summary reports were later leaked to the media, indicating that the proposed manual would lead to the removal of nearly 50 percent of the Nation's remaining wetlands from federal protection, including nearly 70 percent of the remaining wetlands in Iowa. The public comment period on the revised manual was extended to January 21, 1992, and generated more than 30,000 responses.

The latest federal action on this issue (as of this writing) occurred July 29,1992, when the House of Representatives passed an appropriations bill which includes $500 million of funding for a new study of wetland delineation. It authorizes the EPA to commission this study from the National Academy of Science. This study should help put an end to this controversy and provide a framework for wetlands policy based on science and ecology, not political considerations.

Wetland Losses

When discussing wetland losses in the United States, most authors refer to two main sources: *Status and Trends of Wetlands and Deepwater Habitats in the Coterminous United States: 1950s to 1970s* (Frayer 1983) and *Wetlands of the United States: Current Status and Recent Trends* (Tiner 1984). Both of these documents were solicited by the Fish and Wildlife Service (the Service) as part of its National Wetland Inventory project, established in 1974. This section will highlight the findings of these reports, and also incorporate the two most recent publications available: *Wetlands: Losses in the United States 1780s to 1980s* (Dahl 1990), which is a one-time report to Congress, and a 1992 update of the information contained in *Wetlands of the United*

States: Current Status and Recent Trends. This update is required every ten years by the Emergency Wetlands Resource Act of 1986.

Historic Conversion

In the 1780s, roughly 221 million acres of wetlands existed in the 48 coterminous states (Dahl 1990:5). The original wetland acreage is difficult to estimate, because the available information is scattered and largely incomplete. An estimated 104 million acres of wetlands remained as of the 1980s, a loss of nearly 53 percent.

The first report cited above (Frayer 1983) documents the results of the Service's national survey, based on inventories done in 1954 and 1974. This survey showed a net wetland loss in the 48 coterminous states of over 9 million acres, from 108.1 million acres in 1954 to 99.0 million acres by 1974. Although the net loss was 9 million acres, 11 million acres of natural wetlands were actually destroyed. These losses were offset by gains of 2 million acres of newly created wetlands. Annually, the average net loss of all wetlands was 458,000 acres.

The total net loss for palustrine (inland) wetlands was 8.7 million acres, nearly 97 percent of all wetlands lost. There was an increase of 2.1 million acres of palustrine open water wetlands (ponds). Over 200 thousand acres of these gains were found in agricultural land, due to the construction of farm ponds. This was offset by major losses in palustrine vegetated wetlands, which dropped from 99.8 million acres in the 1950s to 88.8 million acres in the 1970s. The average annual net loss of palustrine vegetated wetlands was 553 thousand acres. Palustrine emergent wetlands (marshes and wet meadows), the type most abundant in Iowa, accounted for over 42 percent of this annual loss.

Reasons for Loss

In the past, the government itself has spurred this drastic loss. In the mid-19th century, the federal Swamplands Acts awarded nearly 65 million acres of wetlands to private landowners. In addition, a host of subsidies and programs for farmers and developers actually encouraged the draining and filling of wetlands. In the 20 year Fish and Wildlife Service study, agricultural development involving drainage was responsible for 87 percent of total wetland losses, or 7,830,000 acres (Frayer 1983). Urban development and other development caused 8 percent and 5 percent of the

losses, respectively. Figure 2 summarizes the major causes of wetland loss, from both human and natural forces.

Human Threats: Direct	**Human Threats: Indirect**
* Drainage for crop production, timber production,and mosquito control * Dredging and stream channelization for navigation, flood protection, coastal housing developments, and reservoir maintenance * Filling for dredged spoil, other solid waste disposal, roads and highways, and commercial, residential, and industrial development * Construction of dikes, dams, levees, and seawalls for flood control, water supply, irrigation, and storm protection * Discharges of materials (pesticides, other pollutants, nutrient loading from domestic sewage and agricultural runoff, and sediments from dredging and filling, agricultural, and other land development) into waters and wetlands * Mining of wetland soils for peat, coal, sand, gravel, phosphate, and other materials	* Sediment diversion by dams, deep channels, and other structures * Hydrologic alterations by canals, spoil banks, roads, and other structures, and groundwater withdrawals * Subsidence due to extraction of groundwater, oil, gas, sulphur, and other minerals **Natural Threats** * Subsidence (including natural rise of sea level) * Droughts * Hurricanes and other storms * Erosion and accretion * Biotic effects, e.g., muskrat, nutria, and goose "eat-outs"

Figure 2: Major causes of wetland loss and degradation
(Tiner 1984, In Burke 1988:10)

Consequences

The loss of wetlands has many significant consequences. Natural hydrological systems are disrupted when wetlands are drained or altered. This leads directly to problems with flood control, soil erosion, and water quality. Biological cycles are also upset, eliminating the most productive ecosystems on the North American continent. In 1985, the breeding population of ducks in the United States reached its lowest level since surveys began, as a direct result of this lost habitat (Williamson 1986:27). Many other species of plants, animals, and insects, some threatened with extinction, depend on wetlands. More than half of the areas identified as critical habitat under provisions of the Endangered Species Act of 1986 include wetlands. Recreational and educational opportunities are clearly diminished by declining wildlife populations and wetland loss.

To gain a deeper appreciation of how significant wetland losses are to society, the following sections explore their many functions, benefits, and values.

Functions and Benefits

Wetlands can provide more benefits to society, at lower public costs, than any other type of natural resource. This chapter expands upon the three major categories of benefits associated with wetlands previously mentioned: the provision of natural habitat, ecological functions, and socioeconomic benefits.

Natural Habitat

Nontidal wetland systems provide some of the most productive fish and wildlife habitat in the world. Many types of resident birds and waterfowl are dependent on these areas for breeding, nesting, and as components of migratory flyways. The Prairie Pothole region, encompassing parts of Canada and the north-central United States, is one example of this dependence. Although it contains only ten percent of North America's wetland acreage, this region produces over half of the continent's ducks, with mallard, pintail, and blue-winged teal most abundant (Luoma 1985: 69). Some of the other bird families that flourish in wetlands and their uplands include wrens, plovers, terns, rails, and heron. The pheasant population in east-central Wisconsin is directly related to the amount and distribution of wetlands available (Tiner 1984:15).

Wetlands provide homes for many furbearing animals, such as muskrats, beavers, and otters. Other mammals use wetlands for shelter, food, and drinking water. Examples include black bears in the forested and shrub wetlands of New England, white-tailed deer in the cedar and evergreen swamps of the northern states, and the caribou in the wetlands of Alaska's North Slope (Burke 1988:8).

Inland wetlands provide some of the best habitat for many species of freshwater and game fish, including bass, crappies, bluegill, and catfish. These fish feed on the insects and organisms produced in wetlands, and also use them for spawning areas and nursery grounds. Several reptiles and amphibians are dependent on wetlands. The largest reptiles in this country, the American alligator and crocodile, inhabit wetlands, as well as several species of turtles, snakes, and lizards (Tiner 1984:17). There are roughly 190 species of amphibians in North America; nearly all are dependent on wetlands for breeding (Clark 1979).

There are a great number of water-based plants that are unique to wetlands. This hydrophytic vegetation efficiently converts sunlight into plant material and biomass, producing oxygen as a by-product. This biomass serves directly as food for many species. Waterfowl feed on the seeds of marsh plants while small mammals eat cattail tubers and young shoots. Wetlands can also produce goods for human consumption and use, such as blueberries, cranberries, rice, peat, and lumber. The main value of this biomass lies in providing the base of an aquatic food chain. The detritus formed when plants die and fragment feed aquatic insects which are the diet of resident fishes. Wetlands "can be regarded as the farmlands of the aquatic environment in which great volumes of food are produced annually" (Burke 1988:8).

Studies have consistently proven that many various species are dependent on wetlands, including birds, amphibians, reptiles, invertebrates, mammals, and plants, some already threatened with extinction. It is clear that wetlands play a critical role in maintaining biodiversity in this country.

Other Ecological Functions

This section illustrates the ecological importance of wetlands related to their natural functions of water purification and filtering, storage of flood waters, erosion control, and recharge of groundwater.

Water Purification Because of their location between areas of land and water, wetlands are excellent water filters. Wetlands help purify natural waters by absorbing, diluting, and degrading nutrients, chemical and organic pollutants, and sediment. The removal of nutrients, primarily nitrogen and phosphorous, helps to prevent eutrophication or overenrichment of natural waters (Tiner 1984:18). In Iowa, sources of drinking water have been contaminated by nitrates, which come from nitrogen fertilizers and from natural sources. Iowa State University researchers have found that wetland bottoms contain bacteria that efficiently convert the nitrates into a harmless nitrogen gas (Fowler 1991:2A). It is estimated that careful channeling of the water beneath the cropland of Iowa could result in one acre of wetlands removing nitrates from 100 acres of cornfields. It is possible, however, to overload the capacity of a wetland to perform this function.

Wastewater Treatment Wetlands do an excellent job of removing waste products from water. Certain plants, such as bulrush and cattail, are so efficient in this task that some waste treatment systems have incorporated the use of natural wetlands. The Brillion Marsh in Wisconsin has received domestic sewage since 1923. On the average, this marsh removed 80 percent of biological oxygen demand, 86 percent of coliform bacteria, 51 percent of nitrates, 44 percent of turbidity, 29 percent of suspended solids, and 13 percent of total phosphorous (Tiner 1984:18). It seems clear that our natural wetland systems should not serve as dumping grounds for domestic sewage. However, many communities have developed artificial wetlands or have restored converted wetlands for this purpose.

The Arcata Marsh and Wildlife Sanctuary provides an excellent example. Arcata (pop. 14,600) is a timber and fishing town in Northern California. Arcata was accused of dumping inadequately treated wastewater into Humboldt Bay after the passage of the Federal Water Pollution Control Act in 1972. Its sludge-skimming plant piped city wastewater into an oxidation pond, but the runoff did not comply with the new federal standards. Their solution was to filter the postoxidation pond water through man-made wetlands before piping it into the Bay, in a process called polishing (Willworth 1989:16). After years of political maneuvering, the combined marsh and disposal plant opened in 1985.

NASA's National Space Technology Laboratory in Mississippi has found even broader applications for using man-made wetlands (Washburn 1990:5). All waste,

both human and industrial, is treated in eight artificial wetlands. These marshes remove such things as nitrogen and phosphorous, but also effectively remove heavy industrial wastes like benzene, toluene, and biphenyl. The wetlands remove between 81 and 99 percent of these toxic wastes.

Flood Water Storage Wetlands help regulate stream flow by storing water during periods of heavy rainfall and releasing it slowly, protecting downstream property from flood damage. This function has obvious benefits to agricultural lands; nearly 50 percent of all flood damage is suffered by agriculture as crops and livestock are destroyed and productive land is covered by water. This function has also become increasingly important in urban areas where development has increased the volume and rate of surface water runoff (Tiner 1984:21). Protection of wetlands is an important means of minimizing future flood damages.

Erosion Control The flood storage function above also helps to slow the velocity of water and to lower wave heights, reducing the stream flow's erosive potential. Shoreline erosion can be reduced by wetland vegetation through binding of the sediment with its roots, dampening waves through friction, and reducing velocity through friction (Tiner 1984:23). Most wetland plants require sheltered water for establishment, but once established will effectively control erosion. Bulrushes and reeds are regarded as the best grass-like plants at withstanding wave and current action, and trees such as willows, alders, ashes, poplars, and maples which grow in many riverine wetlands are good stabilizers of river banks.

Groundwater Recharge In general, the water storage function of wetlands allows increased ground infiltration, helping recharge and filter groundwater supplies. However, this recharge potential varies according to numerous factors, including wetland type, geographic location, season, soil type, water table location, and levels of precipitation. Most wetlands are areas of groundwater discharge and many provide sources of water for public use. In Iowa, it is estimated that nearly 80 percent of water for public consumption comes from groundwater. The contamination of these sources from the combined effects of draining wetlands and applying pesticides led to the passage of Iowa's Groundwater Protection Act in 1987, the first of its kind in the nation.

In addition to these ecological functions and values, wetlands in this country have worldwide implications. The consumption of carbon dioxide and production of oxygen in wetland plants mentioned before is the most obvious example, clearly relating to the issue of global warming. Wetlands also play significant roles in the global cycles of carbon, nitrogen, and sulfur (Miller 1990:128).

Socioeconomic Benefits

The values of wetlands as contributors to biodiversity and as critical components of a larger hydrological ecosystem alone should ensure their preservation and protection. Unfortunately, the harsh conclusions reached by Aldo Leopold over forty years ago still apply today. In his essay "The Land Ethic," Leopold chastises the relationship between individuals and their environment as being ". . . governed wholly by economic self-interest" (1949:245). To address this reality of individuals, and the nature of political decision-making in this country, this section offers quantifiable revenues and reduced public costs associated with wetland functions.

Recreation The provision of wildlife habitats clearly relates to many recreational activities, especially hunting, fishing, and trapping. Over 5 million people spent $638 million in 1980 to hunt waterfowl and other migratory birds (Burke 1988:7). Nearly all freshwater fishing is wetland-dependent. In 1975, sport fishermen spent $13.1 billion in the U.S.to catch freshwater fish. Trappers harvest furs from many mammals who frequent wetlands, providing both recreation and a source of income. Louisiana marshes alone yield an annual fur harvest worth from $10 to $15 million.

Other types of recreational activities, such as nature observation, photography, hiking, swimming, boating, canoeing, and ice-skating, are public or social goods and therefore more difficult to quantify. However, in 1980 alone, 55 million people spent nearly $10 billion to observe and photograph waterfowl and other wetland birds (Burke 1988:7).

Natural Commodities The wide variety of natural products that are harvested for human consumption, such as blueberries, cranberries, wild rice, peat, and lumber, provide a livelihood for many people. Wetland grasses are hayed in many places to provided winter livestock feed. Forested wetlands provide timber for homes,

furniture, newspapers, and firewood. The standing value of southern wetland forests alone is $8 billion (Tiner 1984:23). Some wetlands produce peat which is used for horticulture and agriculture. Over 52 million acres of peat deposits exist in the country. Peat has been used as a major fuel source for centuries in Europe.

The vegetation found in wetlands can be harvested and used for energy production on a sustainable basis. Plant parts can be chopped and burned, compressed into brickettes, or gasified into methane. In the Arcata treatment system, the tuber roots of cattails are being harvested for use in the production of ethanol. According to Douglas Pratt, Director of the Bio-Energy Coordinating Office, energy production from biomass sources in the U.S. is around 3-1/2 percent of the total produced, which equals the energy yielded from hydropower and from nuclear power (Mason 1988:12). Currently, most biomass sources are wood and agricultural waste products, but the harvest of wetland vegetation as a renewable energy source is feasible.

Treatment of Wastewater Again it should be emphasized that our natural wetland systems should not serve as dumping grounds for municipal and domestic sewage. The creation or restoration of man-made wetlands for this purpose, however, can treat waste economically while simultaneously providing other societal benefits.

During the planning stages of the Arcata marsh and sanctuary, California state agencies originally pushed for construction of an elaborate regional piping system. Using artificially restored wetlands for the polishing process cost $3 million less than Arcata's share of the "megasystem's" original budget (Willworth 1989:16). Professor Robert Gearhart, one of the project's designers, believes that the savings could have been greater if the entire treatment cycle utilized natural systems, but the state insisted on more "high-tech" (and expensive) methods for primary treatment (Gearhart 1991).

Humboldt, Saskatchewan, uses two artificial wetland cells for the tertiary treatment of its municipal sewage at a cost of four cents per cubic meter. The comparative cost in a nearby traditional sewage plant for its tertiary treatment is 34 cents per cubic meter. The NASA Laboratory in Mississippi has saved several million dollars over the past thirteen years by using its man-made wetlands as opposed to conventional procedures (Washburn 1988:5).

Water Storage Around 134 million acres of the coterminous United States have severe flooding problems. In 1975, 1107 people were killed by flood waters;

property damage for the year was estimated to be $3.4 billion (Tiner 1984:21). In the early 1970s, the New England division of the Corps of Engineers considered various alternatives to flood protection in the lower Charles River watershed near Boston, Massachusetts, including perpetual protection of 8,500 acres of wetlands (Burke 1988:5). They determined that if 40 percent of the wetlands were destroyed, flood damage would increase by a minimum of $3 million annually. Wetland protection was chosen as the least-cost solution to flooding problems.

Aesthetic Values Wetlands are often used as natural laboratories for environmental education. In 1989, the Iowa 4-H Foundation restored wetlands on the 4-H camping center and farm it manages (Walter 1989:58). The farm offers 'how-to' sessions on wetland restoration to farmers and 4-H groups. The current plans for development of a recreation and conservation area in Black Hawk County, Iowa, include restoration of wetlands along the Cedar River and the construction of an educational center that will be operated by the University of Northern Iowa.

Some wetlands are potential areas of archaeological significance. In his book, *of men and marshes*, Paul Errington, former Iowa State University professor and naturalist, describes discovering the fore part of a small skull in the drought-exposed bottom of a marsh in north-central Iowa. It has been described in the National Museum as a new species of Pleistocene otter, whose nearest relative now lives in western Mexico.

Errington also eloquently describes the many intangible and unquantifiable values associated with time spent observing nature, such as serenity, relaxation, and peace of mind.

Summary

Wetlands, both in their natural state and artificially created, are clearly an asset to our society. While a private wetland landowner can derive financial profit from some of these values, it is the general public that receives most of wetland benefits through flood and storm damage control, erosion control, water quality enhancement, and fish and wildlife resources. As an illustration of their importance to society, Congress has made the following findings concerning wetland preservation:

(1) wetlands play an integral role in maintaining the quality of life through material contributions to our national economy, food supply, water supply and quality, flood control, and fish, wildlife and plant resources, and thus to the health, safety, recreation, and economic well-being of all our citizens of the Nation;

(2) wetlands provide habitat essential for the breeding, spawning, nesting, migration, wintering and ultimate survival of a major portion of the migratory and resident fish and wildlife of the Nation; including migratory birds . . . and contain many unique species and communities of wild plants;

. . .

(4) wetlands, and the fish, wildlife, and plants dependent on wetlands, provide significant recreational and commercial benefits, including . . .

(C) fishing, hunting, bird watching, nature observation and other wetland related recreational activities; . . .

(5) wetlands enhance the water quality and water supply of the Nation by serving as groundwater recharge areas, nutrient traps, and chemical sinks;

(6) wetlands provide a natural means of flood and erosion control by retaining water during periods of high runoff, thereby protecting against loss of life and property. [16 U.S.C. section 3901]

The following chapter examines the evolution of significant federal wetland legislation in the United States.

LEGISLATIVE AND JUDICIAL HISTORY

In 1850 and 1860 the federal Swamplands Acts, followed by a series of similar Acts at the state level, awarded nearly 65 million acres of wetlands to private landowners. This legislation reflected the pervasive public attitudes of the time, which viewed wetlands as nuisance areas or wastelands. In addition, a host of subsidies and programs for farmers and developers actually encouraged the drainage and filling of wetlands, including commodity support programs of the USDA, the Small Watershed program of the Soil Conservation Service, and favorable federal Internal Revenue Service provisions (Burke 1988:17). Some of these incentives were still in place as late as the mid-1980s.

As public perceptions of swamps and wetlands have changed, legislative and judicial efforts have attempted to keep pace. According to Burke (1988:17), "[t]here is no doubt that wetland regulation . . . has matured and entered a new phase of innovation and expansion." This is even more evident today. The following sections present some of the most significant legislative and judicial actions associated with wetland protection; it is not intended to be an exhaustive listing of all federal, state, and local laws relating to wetlands. Wetland protection in this country is accomplished by two primary techniques: acquisition of priority wetlands; and the regulation of wetland uses and allowed activities.

Acquisition

The United States Fish and Wildlife Service (the Service) has primary federal responsibility for the protection and management of the nation's fish and wildlife and their habitat, giving them a central role in the acquisition and management of the Nation's wetland resources. The Service was created from direct efforts by a prominent group of conservationists in the 1930s, including members such as Theodore Roosevelt, J.N. 'Ding' Darling, Aldo Leopold, and Frederick Walcott. These conservation leaders and others spawned enactment of the Duck Stamp and Fish and Wildlife Coordination Acts of 1934, the establishment of the Cooperative Wildlife Research Unit Program in 1935, and the passage of the Federal Aid in Wildlife Restoration, or Pittman-Robertson (P-R), Act of 1937. In 1939, the Bureau of Biological Survey, combined with the Bureau of Fisheries from the Commerce

Department, was moved to the Interior Department and renamed the Fish and Wildlife Service. The administration and implementation of these programs and Acts, as well as the jurisdiction encompassed in them, were relegated to the new agency. The evolution and the variety of activities and programs involving the Service are well documented in their publication, *Restoring America's Wildlife:1937-1987* (Fish and Wildlife Service 1987).

These historic achievements go beyond the specific topic of wetlands, encompassing all wildlife and their habitats, but a clear connection is found in the acquisition of wetlands for waterfowl habitat. The Service administers funds collected under the 1937 P-R Act, from federal excise taxes on sporting arms and ammunition, and the 1950 Federal Aid in Sport Fisheries Restoration (Dingell-Johnson) Act, to the states for wildlife habitat acquisition. From 1937 to 1987, nearly 2 million acres of wetlands have been acquired under this program.

Two other current programs directly related to wetland acquisition and implemented by the Service are presented below: the National Wildlife Refuge System, and the North American Waterfowl Management Plan.

The National Wildlife Refuge System

The Refuge System was originally authorized by the Migratory Bird Conservation Act of 1929, and was later incorporated into the jurisdiction of the Service, which currently operates and manages the system. From the mid-1950s to 1987, the Service purchased approximately 2 million acres of wetlands for waterfowl on National Wildlife Refuges, and roughly 500,000 acres for Waterfowl Production areas (Fish and Wildlife Service 1987:70). In 1984, the Service controlled nearly 32 million acres of palustrine wetlands and about 2 million acres of estuarine wetlands (Tiner 1984:54). The main portion of this acreage (28 million palustrine acres and 1 million estuarine acres) was found in Alaskan refuges. According to Don Voros (1992), National Refuge System headquarters, the Service currently controls an estimated 41.5 million total acres of wetlands, as well as 600,000 additional acres of riparian areas along river corridors. Again, the overwhelming majority of these wetlands are found in Alaska.

One of the latest additions to the Refuge System, the Walnut Creek National Wildlife Refuge Project, is currently underway in central Iowa. Land acquisition for this project has already begun with the purchase of 3,587 acres formerly owned by the

Iowa Power Company. This land provides the central core of a proposed 8,626 acre refuge. Two central goals of the refuge are: 1) to protect, restore, develop, and manage a prairie, wetland, stream, and woodland complex for the human values present; and 2) to develop water management programs that create and improve habitat for waterfowl, shorebirds, other migratory birds, and resident wildlife. Exact acreages of wetlands to be restored have not been estimated, but future plans call for the creation of several small 1 to 10 acre wetlands, a few larger 10 to 30 acre wetlands, and development of a few shallow, actively managed wetlands known as Moist Soil Units (Fish and Wildlife Service 1990).

The North American Waterfowl Management Plan

This unique program builds, in part, on previous international treaties related to waterfowl, such as the Migratory Bird Treaty of 1916. It came into existence as a direct result of the major declines in waterfowl populations, which were previously noted, and the recognition that these population declines are intimately connected to the loss of wetland habitats.

The United States and Canada signed this revolutionary agreement on May 14, 1986. It is unique because it represents the first time that the U.S. and Canada have agreed on specific acreages of habitat to protect, and definite numbers of waterfowl to maintain, for hunting and other uses. Mexico was included in this international effort when a Tripartite Agreement was signed in 1988. This plan is further distinguished by its identification of regions within this continent that are distinguished by natural features and boundaries, crossing and involving many geographical jurisdictions. This leads to a necessary multiplicity of intergovernmental relationships, as well as partnerships with private organizations and individuals.

Goals The main goal of this international plan is to restore waterfowl and other migratory bird populations to their early 1970's levels by the year 2000. This involves protecting about 6 million acres of priority wetland habitats, with a minimum of 3.7 million acres in Canada and 2.0 million acres in the United States. Thirty-four geographical areas were targeted as being of special importance as habitat.

Implementation The Plan is administered jointly by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service; it brings together nearly 200 public and private organizations into Plan programs. These partnerships of federal,

provincial, territorial, state, and county agencies, as well as private organizations and individuals, focus on a particular wetland habitat region and are called joint ventures.

Initially, with no clear outline for putting the plan into action and no secure funding source, the plan lay dormant for nearly two years, waiting for the conservation community to discover it (Steinhart 1989). In 1988, the joint venture partnerships began working out ways to implement the plan on a regional level. Today there are two joint venture areas in Canada and seven in the U.S. where waterfowl management projects have been established, as well as two joint ventures which are research efforts to study the Black Duck and Arctic Goose. The Prairie Pothole Region, which encompasses parts of north-central Iowa and will be discussed in detail later, is split into two venture areas, Prairie Habitat in Canada and Prairie Pothole in the U.S. (see Figure 3).

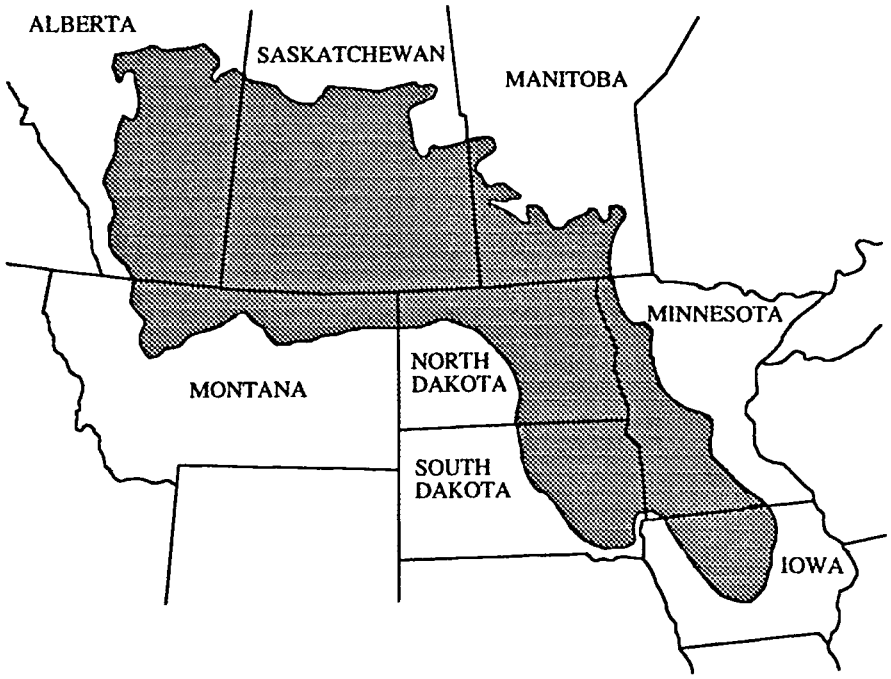

Figure 3: The prairie pothole region
(Fish and Wildlife Service 1989)

By October of 1989, the Canadian ventures had protected or enhanced over 35,000 acres of threatened wetlands and uplands. In the same period, the seven U.S. joint ventures successfully protected, enhanced, or restored nearly 554,000 acres, for a total of 588,853 acres in nine of the 34 areas identified as priority targets.

Costs The price tag on this program is an estimated $1.5 billion over the fifteen year life of the plan. This cost far exceeds the levels budgeted for waterfowl management by both national governments. Originally, this lack of budget commitment contributed to skepticism about the plan's future and the ability of states and private organizations to raise the needed funding (Steinhart 1989:12).

Actual funding contributions from U.S. agencies and other plan partners in 1989 show an impressive financial commitment to the program (see Table 1). Of the total $81 million contributed, $14.7 million, or 18.1 percent, was allocated by the Service, with the remainder as shown below.

Table 1: 1989 U.S. partner contributions
(Fish and Wildlife Service report 1989)

Plan Partners	Contributions
Fish and Wildlife Service	$14,700,000
The States	28,300,000
Non-Government Organizations	26,100,000
Other government agencies	9,800,000
Individuals	2,000,000
Corporations	100,000
Total	$81,000,000

The North American Waterfowl Management Plan is clearly an innovative response to the disastrous loss of wetland areas on this continent. While primarily concerned with restoring waterfowl populations, the importance of wetlands for supporting other species, improving water quality, recharging groundwater supplies,

reducing runoff, and providing recreational and educational opportunities are also implicitly recognized.

This plan is unique because it provides a framework to focus on valuable wetlands in selected areas that are under intense pressure. Although the bulk of the work is still done by existing government agencies within their jurisdictional boundaries, the plan stresses the importance of each subunit being part of a whole which transcends these traditional limits. This regional approach integrates federal, provincial, state, local, public and private groups into a partnership with a mutual objective.

Other Programs

In addition to its mandates for periodic study updates and completion of the national inventory, the 1986 Emergency Wetlands Resources Act raises approximately $20 million a year for federal wetland acquisition (Miller 1990:128). Under the Soil Conservation Service's Water Bank Program, which emphasizes waterfowl habitat acquisition, participating landowners receive annual payments over a 10 year period for preserving wetlands used for waterfowl breeding and nesting. A more recent acquisition effort is the Wetland Reserve Program, authorized by the 1990 Farm Bill. This program is detailed in a later section of this chapter.

Another program administered by the Service, the National Wetlands Inventory, is not directly associated with wetland acquisition, but deserves mention here due to its critical contribution to wetland management.

The National Wetlands Inventory

As noted previously, the 1954 and 1974 wetland surveys undertaken by the Service and the subsequent reports of their findings are the standard references used for estimations of original wetland acreages, wetland losses, and current wetlands status and trends. These documents and studies were solicited by the Service as part of its National Wetland Inventory project, established in 1974. The major goal of the project is to generate scientific information on the characteristics and extent of U.S. wetlands (Tiner 1984:1). The program inherently recognizes the need for this ecological data to help make sound decisions regarding policy, planning, and management of the Nation's wetland resources.

Two distinct types of information are needed to accomplish the goals of the Inventory project. First are status and trends reports, which have been discussed previously. These reports provide improved information for reviewing the effectiveness of existing federal programs and policies, identifying national or regional problems, and enhancing public awareness. Second are detailed wetland maps for geographic areas of critical concern. These maps are intended for use by federal, state, and local agencies, as well as private organizations, for comprehensive resource management plans, environmental impact assessments, permit reviews, natural resource inventories, and wildlife surveys. As of June, 1992, this project has produced over 32,000 detailed wetland maps covering 72 percent of the coterminous United States, 22 percent of Alaska, and all of Hawaii, Puerto Rico, the Virgin Islands, and Guam (Fish and Wildlife Service 1992:2). The Service is scheduled to complete mapping of the coterminous U.S. by 1998, as required by the Emergency Wetlands Resources Act of 1986.

Acquisition is clearly a useful tool for protecting critical wetland habitats, but is insufficient to provide protection for all of our Nation's remaining wetlands. Federal regulations are a vital tool used to preserve these areas and save the many public values they provide.

Regulatory Activities

This section does not address all legislation and litigation related to the regulation of wetlands, but outlines provisions of the most significant federal Acts, including the Clean Water Act and the Food Security Acts of 1985 and 1990.

The Clean Water Act

In 1972, the U.S. Congress passed the Federal Water Pollution Control Act. Later amended as the Clean Water Act (CWA), this is clearly one of the most significant pieces of environmental legislation ever passed. The law contains strong language in declaring its expansive goal: to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" [33 USC section 1251(a)]. The key provision of the CWA which relates directly to regulating uses and activities associated with wetlands is Section 404.

Section 404 of the CWA provides the authorization for the primary federal program regulating activities in wetlands. Section 404 expressly prohibits the discharge of dredged or fill material into the "waters of the United States" without approval from the Army Corps of Engineers (the Corps). The Corps has established and promulgated a regulatory program for Section 404 permit applications and activities. A related regulatory program is also administered by the Corps, authorized by Section 10 of the River and Harbors Act of 1899. This section requires a permit from the Corps for dredging or the placement of fill or structures in the navigable waters of the United States. Coverage under this provision extends only to traditionally navigable waters, and is largely coextensive with Section 404 coverage (Burke 1988:19).

Before issuing Section 404 permits, the Corps reviews applications using the environmental guidelines contained in Section 404(b)(1). The two most critical standards are the requirement that practicable alternatives be considered and the degree that a project is water dependent.

Other important features of Section 404; its jurisdictional reach, activities which it regulates, the general permit program, and its provision of joint authority between the Corps and the Environmental Protection Agency; are outlined below. The importance of these features for national-state relations is found in Section 404(g), which is a partial preemption provision allowing states to assume authority from the Corps and the EPA over the Section 404 permit program.

Jurisdiction The 1972 amendments to the CWA re-defined the term "navigable waters" expansively as "the waters of the United States." The geographical jurisdiction of the Corps under Section 404 relates directly to interpretation of this change in terms. The Corps, however, essentially ignored this change until they were required to take notice by a series of court decisions. In *United States v Ashland Oil* (1974), a small, non-navigable tributary was held to be within the definition. In *U.S. v Holland* (1974), jurisdiction was sustained over pollution in non-navigable man-made canals and the filling of mangrove wetlands above the mean high water line. Finally, in *Natural Resources Defense Council v Callaway* (1975), the District Court for the District of Columbia held that jurisdiction extended to the maximum extent possible and ordered the Corps to prepare new regulations under section 404. A legislative effort to

limit this holding failed, and the expanded definition was incorporated into the CWA of 1977. The relevant 1977 definitions are:

> The term "waters of the United States" includes "...isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not part of a tributary system to interstate waters or to navigable waters of the United States, the degradation or destruction of which could affect interstate commerce."
>
> The term "wetlands" means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." [33 CFR section 328.3]

These new definitions were upheld and supported in *The Avoyelles Sportsmen's League, Inc. v Alexander* case in 1981. In the 1985 case of *U.S. v Riverside Bayview Homes*, a unanimous U.S. Supreme Court upheld regulatory authority under the CWA to include wetlands adjacent to, but not necessarily hydrologically connected with, other waters of the U.S. A more recent federal district court decision seems to restrict this jurisdictional reach. In *National Wildlife Federation v Laubscher* (1987) the court held the Corps had the discretionary authority to review isolated wetlands (those not connected with other navigable waters or their tributaries) on a case-by-case basis, but that it did not have to find that isolated wetlands were subject to Section 404 permitting requirements.

Regulated Activities Section 404 authorizes the Corps to issue permits for the discharge of dredged or fill material into navigable waters of the United States under certain conditions. In *U.S. v Byrd* (1979), the court, building on the expanded definition of wetlands as waters of the nation, held that filling marshland is pollution covered under the Act. Other cases have also contributed to clarifying activities that are covered by the Act. In *U.S. v Fleming Plantations* (1978), the court held that the construction of a drainage ditch or levee in a wetland requires a permit. This decision also expands the definition of pollution to include dirt and fill materials. In the

Avoyelles case cited above, the court also decided that clearing of wetland vegetation is also covered by Section 404.

The General Permit Program In addition to issuing individual permits for dredge and fill activities, Section 404 also authorizes the Corps to utilize general permits for the conduct of certain activities in covered waters, including wetlands. General permits vary from statewide to nationwide, and are issued for categories of activities that are similar in nature. It is presumed that the individual and cumulative impacts of these activities will have minimal effects on water quality and the aquatic environment. The Corps has promulgated one nationwide permit, Number 26, that covers discharges into two classes of waters: "nontidal rivers, streams, and their lakes and impoundments, including adjacent wetlands, that are located above the headwater" and "other nontidal waters of the United States, including adjacent wetlands" [33 C.F.R. Part 330.5(a)(26)]. This "headwaters and isolated waters" permit covers wetlands that are 10 acres or less in size and in which the flow is less than five cubic feet per second (Burke 1988:19).

Joint Authority The 404 permit program is administered jointly by the Corps and the Environmental Protection Agency (EPA). The Fish and Wildlife Service and the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration are included as advisory and commenting agencies.

The EPA also has a significant role as a regulatory agency under section 404. The EPA has authority to adopt substantive standards for permit issuance in conjunction with the Corps, and may designate areas in which no permit may be granted. Under section 404(c), the EPA also has authority to veto or override the grant of a permit by the Corps. Although approximately 160,000 applications have been processed by the Corps since 1972, the EPA had completed only five veto actions prior to *Bersani v EPA* (1988). This case is examined in depth below, to provide a vivid example of the conflicts and confusion present in wetland regulation and litigation.

Bersani v EPA [850 F2d. 36, 40 (2d Cir. 1988)]. This case may well be remembered as the most crucial legal battle over the regulation of wetlands in the U.S. (Krohe 1989:8). This controversy concerns developers' efforts to locate a regional shopping mall in Sweedens Swamp, a red maple marsh covering between fifty

to sixty acres of an 80-acre tract near Attleboro, Massachusetts. In 1979 the Mugar Group, Inc. filed an application to construct the mall, including notices required under the Mass. Wetlands Protection Act. The application was approved by the Attleboro conservation commission. That decision was appealed by a local citizen's group to the state Department of Environmental Quality Engineering (DEQE). Nearly three years later, the DEQE's regional office reversed the local decision.

By this time, the DeBartolo Corp. had acquired the site and filed an appeal to DEQE's central office in Boston. While this appeal was pending, an affiliate of the Pyramid Companies had purchased the property and submitted a revised application which included mitigation measures. After formal administrative proceedings, the Department approved the project in March 1985. The citizen group appealed to the state superior court. They argued that the DEQE mistakenly treated Pyramid's application as a continuation of the 1979 application, therefore exempt from more restrictive wetland legislation that was passed in 1983. The superior court agreed, reversing the department's approval. Pyramid appealed and the Supreme Judicial Court reversed again, holding in part that the agency had correctly grandfathered the project under the earlier rules. *Citizens for Responsible Environmental Management v Attleboro Mall* (1987).

Pyramid then began the Section 404 process, seeking a dredge and fill permit from the Corps. The EPA and other resource agencies filed adverse comments based on the proposal's destruction of wetland values. The local office of the Corps recommended denial of the permit, based on the Section 404(b)(1) guidelines previously mentioned, because the shopping mall was not water dependent and there was an alternative site available in the area. The Corps' Washington headquarters then called up the controversy for a decision. After its own study, the national headquarters reversed the local office and recommended granting of the permit, stating that the developer's offer to provide mitigation by creation of new wetlands on a nearby site made the project no more harmful than it would be on the alternate site.

The EPA regional administrator then took the seldom used step of holding a hearing to determine whether to veto the Corps' decision. A year after the Corps granted the permit, the EPA vetoed it. The EPA, for the first time, indicated that adverse environmental effects caused by wetland loss are unacceptable under section 404(c) if those effects are avoidable under section 404(b). Moreover, the EPA adopted a "market entry" theory that deemed wetland destruction avoidable if an alternative

upland site existed when the developer first explored the real estate market, even if the alternative became unavailable by the time of the permit application.

Pyramid challenged various stages of the EPA's decision in three separate federal courts in New York, Massachusetts, and the District of Columbia. [See *Newport Galleria Group v Deland* (1985), *Bersani v Deland* (1986), and *Bersani v U.S. EPA* (1985)]. Each federal district court upheld the EPA. On appeal from the final EPA decision, the Second Circuit Court of Appeals upheld the EPA in June, 1988. The case was denied certiorari by the Supreme Court on March 20, 1989, nearly ten years after the initial application was filed.

This case illustrates the problems faced by private groups, business interests, and the government when dealing with the Section 404 program; they must often rely on the courts to resolve their controversies and to interpret enabling legislation.

Bersani also provides an introduction to the concept of mitigation, another controversial topic closely connected to wetland regulations. The developers in this case offered to create new wetlands at an off-site location, to mitigate the damage to the wetlands in the area they wished to develop. Many environmentalists are opposed to this practice, believing that the artificial wetlands created under a mitigation agreement are not of the same quality as natural wetlands.

The focus of activities regulated under Section 404 is limited to the dredging and filling of wetlands. Section 404 contains few provisions relating to drainage of wetlands, and exempts agricultural and silvicultural activities. As noted previously, draining for agricultural activities contributed to 87 percent of wetland losses during the 1954 to 1974 survey conducted by the Fish and Wildlife Service. The Food Security Acts of 1985 and 1990 (commonly referred to as the Farm Bills) contain provisions to help address this aspect of wetland regulation.

The 1985 Farm Bill

This is essentially an omnibus bill, encompassing many programs and policies related to agriculture and administered by the Department of Agriculture (USDA). Major sections are devoted to price support loans and target prices for commodities, farm credit, domestic food assistance, trade and aid, research and extension, and resource conservation. In the 1985 bill, conservation efforts were primarily directed

toward soil erosion. Wetland loss was directly addressed by the "swampbuster" program.

The Conservation Reserve Program (CRP) The main purpose of this program was to enroll highly erodible land into the reserve, removing it from agricultural production for ten years. Although not specifically dealing with wetlands, land enrolled in the CRP has been the impetus for the Wetland Restoration Program administered by the Iowa Department of Natural Resources, which is explored in more detail in chapter five.

Swampbuster Essentially, a "swampbuster" is a producer who plants an agricultural commodity on a wetland that was converted after December 23,1985, the effective date of the Act. As mentioned previously, farm benefits and subsidies from the federal government have significantly contributed to the past and current destruction of wetlands. The purpose of the swampbuster provisions are to insure that federal farm programs do not serve as a motivation for draining additional wetlands.

Definitions The identification and determination of wetlands is carried out by the Soil Conservation Service (SCS). The SCS in 1985 based their activities on the definition of wetlands developed by the Fish and Wildlife Service, as presented earlier. By this definition, wetlands are lands where water saturation is the dominant factor determining the nature of the soil and vegetation growing on the land. Under this framework, five working categories were developed to implement swampbuster.

> **Natural Wetland (W):** An area of predominantly hydric soil which can support a prevalence of water-loving plants. Cattails, willow trees, sedges, rushes, some smartweeds, or other water-loving plants are often present.
>
> **Abandoned Wetland:** Wetlands that were once altered or farmed, but have been abandoned on cropland. No attempt was made to maintain the area as cropland for at least five successive years, and it now supports water-loving plants.
>
> **Converted Wetland (CW):** A wetland (area of hydric soil) drained or altered after December 23,1985, to enable production of an agricultural commodity.
>
> **Farmed Wetland (FW):** A wetland that was partially drained or altered to produce crops prior to December 23,1985. The

land was not completely drained, and may have potholes or seasonably flooded areas hat still meet wetland criteria.

Prior Conversion (PC): Wetlands that were converted to cropland use prior to December 23,1985. This cropland was completely drained or otherwise altered to make it possible to produce crops, and it no longer meets wetland criteria of saturated soil or water-loving plants.

The Act allows for some type of production of agricultural commodities on all but the converted wetland defined above. Even a natural wetland may be used fort agricultural production when weather permits, if no altering of the wetland takes place. Drainage maintenance is allowed on a Farmed Wetlands and on Prior Conversion land, but additional drainage is only allowed on those lands that are classified as PC.

Enforcement While the SCS makes decisions regarding wetland classification, the Agriculture Stabilization Conservation Service (ASCS) is charged with handling violations and enforcement. Producers found to be in violation of converting and planting on wetlands may lose their eligibility for other USDA benefits and programs. These include price and income supports under the commodity programs, refund of payments, loans from the Farmers Home Administration, disaster payments, and crop insurance.

The Department of Agriculture reports that as of May 1, 1989, the ASCS had filed 425 determinations of ineligibility, costing producers nearly $975,000 in lost benefits. Conservation activists are quick to counter that almost all of these determinations are being challenged and that over half have been overturned. Others believe that poor implementation and enforcement have weakened the law's effectiveness (Steinhart 1989:9).

The 1990 Farm Bill

In addition to its considerations of the swampbuster provisions, the 1990 version of the Farm Bill addressed a broader conservation agenda. The 1985 Act's resource conservation issues focused on soil erosion; in 1990 this situation was believed to be mostly under control and water quality concerns rose to take center stage. This included changes to swampbuster, as well as other changes in existing programs and new initiatives related to wetlands.

Swampbuster Changes

Definitions The existing five categories of wetlands are reduced to four by the removal of Abandoned Wetland as a classification. The definition of a Natural Wetland remains unchanged, and Converted Wetlands, Farmed Wetlands, and Prior Conversion wetlands retain their original designations and December 23,1985 as the critical date.

Violations One significant change in the 1990 bill is that a violation is triggered by converting a wetland, not when a crop is planted on it. Any alteration or drainage after November 28,1990 that makes the production of an agricultural commodity possible is now considered swampbusting. The ineligibility for benefits was also extended to include additional programs (including new programs introduced in the 1990 bill).

The penalties for violations were also restructured. Graduated penalties are now retroactive for "good faith" violations which occurred between the two effective dates of the bills, December 23,1985 and November 28,1990. These penalties only apply to first time, unintentional violations under the following terms: a loss of benefits from $750 to $10,000 will be assessed, depending on the severity of the offense; producers are limited to one violation in ten years; and the converted wetland must be restored to regain eligibility for USDA programs.

Inventory Another key change is that the bill requires an inventory and mapping of wetlands. The difficulty with identification experienced by the Soil Conservation Service under the 1985 bill should be lessened by this requirement. An inventory of what wetlands remain is a critical initial step in making determinations and enforcing violations of wetland conversion.

Exemptions The 1990 Act also expands the exemptions to swampbuster. These now include production of agricultural commodities on artificially created water bodies, wet areas created by water delivery systems, and wetlands where conversions commenced prior to December 23,1985.

Other Changes Another new provision requires that the SCS consider claims by producers that their draining activities have a "minimal effect" on a wetland. Also, an on-site inspection is now required before benefits are withheld. A significant change in the Conservation Reserve Program is the inclusion of wetlands and filter strips as eligible lands which may be enrolled. (This relates to new programs discussed later.)

Evaluation Clearly, many of these changes can lead to positive changes in wetland preservation, such as the completion of an inventory and having violations triggered by altering rather than planting on wetlands. Other provisions were met with skepticism. The graduated penalties for first-time offenders indicates a continuation of a policy based more on voluntary compliance than harsh regulations. From a cynical point of view, this provision could lead to more illegal draining by producers who have no previous violations. The minimal effects clause led to suggestions by agricultural interests that the SCS should allow farmers to drain wetlands if they create or restore new wetlands elsewhere, under the practice of mitigation. Fortunately, the SCS rejected this idea, clarifying that the purpose of swampbuster is the preservation of natural wetlands, not replacing them with artificial ones.

These provisions were debated for months before the bill's passage, with a consortium of environmental groups and commodity organizations participating. The inclusion of the more questionable provisions mentioned above have been viewed as a concession by conservation advocates in return for new programs addressing wetland protection and improvements in water quality (Anthan 1991).

New Programs In addition to its inclusion of filter strips and wetlands as eligible lands, the Conservation Reserve Program was renamed the Agriculture Resources Conservation Program (ARC) and was combined with the newly-created Wetlands Reserve Program to create the Environmental Conservation Acreage Reserve Program (ECAR).

The Agricultural Water Incentives Program Authored by Sen. Tom Harkin, D-IA, the purpose of this program is to reduce non-point pollution sources on up to 10 million acres. The program is voluntary; producers may enter 3 to 5 year agreements to develop and implement a water quality management plan that provides water quality benefits and that may provide additional wetland protection and wildlife benefits.

The Wetlands Reserve Program The Reserve Program was established to preserve 1 million acres of wetlands by 1995, with 200,000 acres to be enrolled each crop year . The reserve establishes conservation easements of 30 years or more on privately owned land; a pay structure is outlined. The program is designed to

pay farmers fair market value to stop farming and restore wetlands on marshes that were previously drained. The definition of eligible acres is discussed at length, with a related discussion of how the USDA and the Fish and Wildlife Service are to coordinate their efforts. The Soil Conservation Service is to provide technical assistance and cost sharing for the easements.

Current Status These wetland related provisions and other conservation measures led to the 1990 Act being hailed as the "most progressive environmental farm bill ever" (Anthan 1991). However, implementation of these provisions since 1990 do not entirely support this claim.

In July of 1991, the House Appropriations Committee, "in an arrogant and misguided display of raw power" (Anthan 1991), declined to provide full funding for the Wetlands Reserve and Water Quality Incentives programs. The Congressional Budget Office had allocated $220 million for these plans, but Appropriations gave nothing to the Reserve Program and only allowed $3.5 million for the Incentive program. This action was justified in a 25 word statement made by the Appropriation's chairman Rep. Jamie Whitten, R-MS, who claimed that the reserve program should not be allowed because "we are going to have to start using our land to produce on so we can pay our debts and keep our farmers in business" (Anthan 1991:1J).

In May of 1992, the USDA announced that a pilot Wetlands Reserve Program would provide $46.4 million for easements on 50,000 acres of farmland in nine states, including Iowa. Farmers will be able to enter the program by submitting a bid on how much money they will require to allow acres to return to wetlands. Priority will be given to farmers who agree to restore the land to permanent wetlands. Farmers in the eight states submitted plans to enroll over 466,000 acres of wetlands, far exceeding the 50,000 planned. More Iowa farmers signed intentions to participate in the pilot program than any other state involved. Over 750 Iowa farmers have submitted plans to enroll over 43,000 acres into the program, more than the total number of current wetland acres in the state.

Despite this interest in participating in the program, the 1992 Congress did not authorize continued finding for this new program. Supporters of the program asked that one-sixth of one percent of USDA appropriations be shifted from the Market Promotion program to fund the reserve. Instead, the market program received a full

$150 million appropriation to subsidize overseas promotion of goods produced by major corporations.

Another important event which will affect future administration of swampbuster is the recent inclusion of citizen groups in the overall process. In 1986, the National Wildlife Federation (NWF) opened a Prairie Wetlands Resource Center in North Dakota. One of six such centers throughout the country, it focused efforts on making sure swampbuster provisions were being correctly enforced (Steinhart 1989:10). The Farm Bills allow farmers to appeal action against them, but did not have a procedure for citizens seeking to protect wetlands until 1988, in response to NWF activities. The NWF then went a step further and filed the first court challenge ever under swampbuster. In the 1990 case *National Wildlife Federation v Bottineau County*, the Eighth Circuit Court of Appeals upheld the ability of the NWF and its members to sue the USDA and the Bottineau County ASCS over their granting of a swampbuster exemption (Hamilton 1990:114).

Related Federal Statutes

The Endangered Species Act of 1986 relates to wetland protection under the public trust doctrine. According to this principle, the sovereign holds certain important natural resources in trust for the people, to preserve them for particular public uses. Traditionally, this doctrine has protected the public interest in navigable waterways, preserving public uses of navigation, commerce, and fishing. The Rivers and Harbors Act (RHA) of 1899 described previously is one example. More than half the areas identified as critical habitat under provisions of the Endangered Species Act include wetlands. This Act has not yet been a vehicle for taking issues to the courts, mainly because any single area cannot be proven to be the only habitat available for a protected species (McCurdy 1989:696).

Another significant federal law related to wetlands is the National Environmental Policy Act of 1969. This legislation contains a requirement that federal projects prepare an environmental impact statement (EIS) as a part of project reviews. Clearly, the development of projects which adversely affect wetlands can be halted by a negative EIS.

Summary

The involvement of so many actors and agencies in wetland protection programs has led to the current situation of controversy and conflict, which has been described as a regulatory morass. This chapter has attempted to sort out the various roles played by federal agencies, the federal courts, and the private sector. The following chapter employs concepts and theories of intergovernmental relations to provide a transition from this national perspective to the roles of state agencies in wetland protection.

INTERGOVERNMENTAL RELATIONS

This chapter presents a discussion of intergovernmental relations in order to provide a larger context in which to evaluate the federal wetland laws presented, especially their provisions for state roles and responsibilities. Clearly, an exploration of this topic is inherent in the implementation, administration, and management of this federal legislation.

These relationships among federal, regional, state and local government agencies, as well as the inclusion of private groups, have been referred to throughout the preceding chapters. Examples are state and county roles in implementing the swampbuster provisions of the Farm Bills, and the partnerships (between all levels of the public sector and private groups) formed under the North American Waterfowl Management Plan. The provisions of the Clean Water Act that involve public management and regulation of activities in wetlands are explored in detail, focusing on certain sections that outline administrative responsibilities and relationships for national and state governments. An analysis of how these provisions relate to the context of federalism, and to the future of intergovernmental relations in wetland protection, is presented in the chapter summary.

Concepts

Although the terms federalism and intergovernmental relations are often used interchangeably in the relevant literature, they are different political concepts. Federalism refers to the division of power between the national government and the states, emphasizing the constitutional delegation of roles and responsibilities to each level. Intergovernmental relations more aptly describes the processes of governmental operations and interactions, and the degree of administrative and fiscal cooperation, within the framework of federalism. The basis for the separate and shared responsibilities of federalism is provided in the Articles of the Constitution, which delineate specific powers granted to the national government and delegate other general responsibilities to the states.

Various theories and models of federalism have evolved over time in this country, each with its own definitions and concepts. Many authors agree that federalism has lost any definitive meaning. A survey of contemporary scholarship on

this topic concludes that the theory of federalism has fallen into disrepair (Beam 1983). Descriptions of the evolution of federalism vary, but most agree on basic periods of history in the United States and the associated model or theory of federalism common during these periods. The following descriptions of these periods draw heavily upon Thomas Dye's 1990 book *American Federalism.*

Dual Federalism

The model of dual federalism basically describes national-state relations during this nation's first hundred years. This model is a direct interpretation of the division of governmental functions and authority outlined in the Constitution. Article I, Section 8 contains a specific list of powers granted to the national Congress, such as levying taxes, regulating commerce, coining money, providing for national defense, and granting copyrights and patents. The Tenth amendment states that all powers not delegated to the national government, nor forbidden to the states, "are reserved to the states respectively, or to the people."

Dual federalism mirrors the views of James Madison, who wrote in *Federalist* Number 45 that: "[t]he powers delegated by the proposed Constitution to the federal government are few and defined. Those which are to remain in the State governments are numerous and indefinite." In the 1871 *Tarbel's Case* the Supreme Court defined American federalism in a similar manner, stating: "There are within the territorial limits of each state two governments, restricted in their sphere of action, but independent of each other, and supreme within their respective spheres." In 1966, Grodzin described dual federalism as a "layer cake," with each level of government exercising unchecked power in its own domain (Grodzins 1966). He also articulated the growing belief that this model has never truly been an accurate description of federal-state relations, describing federalism instead as a "marble cake."

Cooperative Federalism

This "marble cake," or cooperative federalism, is believed to best describe federal-state relations in the first half of the twentieth century. This model allows for overlap and mixing of federal and state responsibilities. According to Grodzin (1966:265): "As the colors are mixed in a marble cake so functions are mixed in the American federal system." In this model, the normative bias was toward expected cooperation of states and communities in achieving goals determined by the national

government. Under cooperative federalism, Congress relied upon its taxing and spending powers to establish a system of financial rewards and punishments to achieve national goals. These financial incentives usually take the form of giving or withholding grants-in-aid, which are examined more closely in a later section.

Centralized Federalism

According to Dye, this model of federalism is indistinguishable from a centralized government (Dye 1990:8). The period of U.S. history associated with this type of federalism was initiated in 1964 by President Johnson's Great Society. Under centralized federalism, the federal government assumed the power to define national problems and set goals in most areas of public policy, such as education, health, welfare, consumer safety, and water and air pollution. Under this model, state governments are viewed as administrative instruments of the national government, and the federal level may legislate directly to the states. This federalism theory is still defended as a means to provide effective governance, which requires close federal supervision and control to assure that national purposes are served. Current proponents of this model base their claims on the idea of representation, that our national officials are selected from our subunits of government.

Fiscal Federalism

The notion of fiscal federalism has been developed by economists who have sought efficiency in the provision of government goods and services. From this perspective, fiscal federalism generally deals with the assignment of government functions, and sources of revenue, to different governmental levels. This model of federalism largely ignores political, social, and equity concerns, focusing primarily on cost-efficiency and the results of revenue transfers between national, state, and local governments.

New Federalism

The term "new federalism" originated in the Nixon administration, where it was used to describe general revenue sharing (the sharing of the national government's tax revenues with state and local governments with few strings attached). In general, new federalism is associated with attempts to reverse centralizing tendencies in American government and to restore a balance of power between the nation and states (Dye

1990:12). President Reagan used the term to describe a series of policies and proposals designed to reduce federal spending for domestic programs and to provide incentives to the states to undertake greater responsibilities. This decentralization effort was a response to a general public sentiment that national government has grown too large and that state and local government has lost control over making key decisions. In execution of this policy, the Reagan administration overhauled the intergovernmental grants-in-aid system, making large cuts in grants to state and local governments and various private, nonprofit organizations.

Competitive Federalism

It is the central theme of Dye's book that the founders of the Constitution sought to construct a governmental system incorporating the notion of "opposite and rival interests" (Dye 1990:3). These opposing interests were intended to prevent tyranny of the majority through a system of checks and balances, which would foster competition between levels of government to provide public goods and services. In the author's words, "competitive federalism envisions a marketplace for governments where consumer-taxpayers can voluntarily choose the public goods and service they prefer, at the cost they wish to pay, by locating in the governmental jurisdiction that best fits their policy preferences" (Dye 1990:14). Under this theory, governments are forced to improve services, reduce costs, and become more efficient.

A major problem with this model of federalism, and also inherent under fiscal federalism, is that American governments perform a host of public services which cannot be easily quantified nor measured in dollars. The use of fiscal or quantitative models are therefore not applicable to many of the services and public benefits provided by governments. The importance of these services and regulatory activities; such as the provision of water, gas, and electricity, and protection of the environment; is not reflected in simple expenditure and revenue figures.

Coercive Federalism

John Kincaid takes a somewhat different view of the evolution of American federalism than Dye's. Kincaid believes that cooperation remained the dominant theme throughout the centralized federalism of the Great Society, and continued beyond the new federalism of the Nixon administration. He cites that cooperative

federalism during this period was in part a political response to the affluence following the Korean War and to issues of social equity, such as racism, urban poverty, individual rights, and environmentalism. He then states that when these underlying conditions changed in the 1970s, the "pressure to expand national power inherent in cooperative federalism gave rise to coercive federalism" (Kincaid 1990:139).

Under coercive federalism, the federal government has reduced its reliance on fiscal tools to induce intergovernmental policy cooperation and increased its use of regulatory tools. This shift has produced a more coercive federal system, resulting in federal preemptions of state and local authority and unfunded mandates on state and local government. The use of these federal powers, as well as other factors which affect intergovernmental relationships, are further explored in the following section.

The Determinants of Intergovernmental Relations

This section outlines the major elements which influence intergovernmental relations. As noted above, some of the powers that the federal government has used to exert influence on the states are: intergovernmental transfers and the grant-in-aid system, the use of mandates, and its powers of total and partial preemption.

Intergovernmental Transfers

Since the first transfer of land from the national government to the states under the 1787 Northwest Ordinance, the transfer of resources between different levels of government has been an integral part of federalism. The amount of resources transferred, and their effect on the relations between the different levels, has far exceeded the original delineation of powers envisioned by the framers of the Constitution.

Several studies conducted in the 1960s identified federal intergovernmental transfers as a major determinant of state and local government spending (see Fisher 1961; Kurnow 1963; Sachs 1964). Michael Reagan (1972:17) summarized the academic efforts of the time by stating that "federalism needs to be re-examined, . . . by close description and analysis of the major forms of continuing actual interaction between the levels of government in the United States." This transfer of money and

other resources is usually referred to collectively as the intergovernmental grants-in-aid system.

Reagan defines a grant-in-aid as "money payments furnished by a higher level of government to be used for specified purposes and subject to conditions spelled out in law or administrative regulation" (Reagan 1972:55). Reagan and Sanzone (1981:156-159) offer the following summary for the justification of grants in an intergovernmental system:

1) To establish minimum national standards in some program that exists in all states, but at differing levels.
2) Equalization of resources.
3) To improve the substantive adequacy of state programs.
4) Concentration of research resources.
5) The stimulation of experimentation and the demonstration of new approaches.
6) Improvement of state-local administrative structure and operation.
7) Encouragement of general social objectives.
8) Minimize the apparent federal role.

There are three general types of transfers which have been utilized historically in the grant-in-aid system; categorical grants, block grants, and general revenue sharing. The key characteristics which distinguish these kinds of grants are: the range of national funding discretion; the range of discretion exercised by grant recipients over aided activities; and the type, number, detail and scope of nationally imposed administrative conditions (Advisory Commission on Intergovernmental Relations 1978).

Categorical Grants These grants are specified for narrowly defined purposes and usually require some form of matching funds from the recipient. They are usually distributed on a needs basis or by the fair share principle. Categorical grants can provide specific benefits to discrete constituencies, and are often tailored to fit programs with broad national support. These grants give the national bureaucracy the greatest control over who gets funded, under specific administrative conditions, and delegates the least amount of recipient choice in program service.

Block Grants A block grant basically consolidates separate categorical grants into one package. They are usually dispersed on the basis of formulas, and require recipients to compete for funding. Block grants are generally intended to serve a national purpose through funding of eligible projects. The most commonly cited example of this type is the Community Development Block Grant program, which continues to provide funding for a variety of community-based services and activities. Block grants allow the national government little funding discretion, a greater range of recipient discretion, and a middle range of imposed administrative conditions.

General Revenue Sharing As noted previously, this sharing of national tax revenues with state and local governments was enacted during the Nixon administration as a core part of "new federalism." Advocates of general revenue sharing (GRS) believed that categorical grants were unreliable and tended to have a narrow focus. Those opposed to GRS argued that the units of government that spent tax money should also raise it, and that states were inadequately prepared to be trusted with greater discretion. Opponents were also concerned that GRS would have a negative effect on the accomplishment of national goals and objectives. Clearly, general revenue sharing gives the least national funding discretion and imposed conditions, and the most recipient choice.

From Johnson's Great Society programs of the early 1960s to the 1980 presidential election, the intergovernmental grant-in-aid program went through significant changes. In his thesis, David Long (1988:15) summarized these changes as follows: the number of federal grants increased tremendously, the amount of funds transferred grew rapidly, grant programs were increasingly based on the notion of serving national goals, direct grants to cities were instituted, categorical grants proliferated, and grantsmanship skills gained increased importance for state and localities.

As noted above, when President Reagan took office in 1981 he advocated a policy of decentralization. In execution of this policy, the Reagan administration overhauled the intergovernmental grants-in-aid system, combining 57 categorical grant-in-aid programs into nine new or restructured block grants. While this allowed

the states a degree of regulatory relief, the total amount of federal aid to states and localities was significantly reduced. Also, the federal government has increased its use of regulatory tools, such as mandates for state and local government activities and federal preemptions of state and local authority .

Regulatory Tools

In a recent article, Joseph Zimmerman emphasizes the employment of federal mandates and preemption powers by Congress to "structure national-state relations" (Zimmerman 1990:49).

Mandates A federal mandate is a statutory provision, administrative regulation, or federal statute that requires state and local governments to undertake a specific activity or to provide a service which meets minimum standards. Enforcement of these mandates can be problematic, because a state may be unable or unwilling to comply with the requirements. If a state decides not to comply with a federal mandate, options for enforcement can include withholding related federal funds or the imposition of fines.

Many federal mandates in the 1970s were related to increasing concern over the environment. Examples include the 1972 Federal Water Pollution Control Act (later amended as the Clean Water Act), which requires state and local governments to adopt better sewage treatment methods to curb the discharge of pollutants, and the 1974 Safe Water Drinking Act, which requires all suppliers of drinking water to regularly test their waters for impurities. These and other federal laws related to protection of public health and the environment are examples of preemption, a type of mandate that has become increasingly important in areas of concurrent national and state responsibility. Further examples are presented below.

Preemption Federal preemption (also called supersession) of state authority has its basis in the supremacy clause of the Constitution, which grants the national government the ability to nullify concurrent state laws by exercising one or more of its delegated powers. According to Zimmerman (1990:49), the "growing importance of federal preemption" is attributable to three factors: 1) judicial decisions which protect constitutional guarantees, 2) U.S. Supreme Court decisions which generally support preemption statute, and 3) less federal money available for

conditional grants-in-aid and tax credits to induce subnational units to execute national policies in regulated fields. Two types of preemption are used by the national government, total and partial, with several statutes providing for both.

Early total preemption statutes, such as the Copyright Act of 1790, stipulate that the national government will exercise all regulatory powers in the preempted field. Over time, Congress recognized that states could play a limited role in administering several preemption statutes. For example, the Atomic Energy Act of 1959 amended the 1946 Act to "provide for a turn-back of limited regulatory authority to the states" (Zimmerman 1990:50). It is important to remember that even under total preemption by a state, its powers are still specifically delineated by the federal government.

In 1965, Congress introduced the standard partial preemption. Under this type, Congress or federal administrative agencies promulgate rules and regulations that establish minimum national standards. If a state wants to assume regulatory responsibility, it must submit a plan containing standards at least as stringent as the national ones to the appropriate federal agency for approval. Congress has enacted a number of standard partial preemption statutes, especially in the areas of health and the environment. Zimmerman (1990:51) provides an example of the "kaleidoscopic nature of national-state relations produced by standard-partial-preemption" which involves the Safe Drinking Water Act of 1974 and Iowa. In 1977 Iowa was granted primacy over regulation of this Act, but returned responsibility back to the Environmental Protection Agency in 1981 due to financial problems. Resolution of these problems led to the redelegation of primacy to Iowa in 1982.

Summary

A detailed defense or refutation of the preceding theories and ideas is not indicated by the relevant literature, but some general observations can be made. According to Kincaid (1990:150), "the 1990s opened up with no consensus on the proper course of American federalism." Zimmerman, however, suggests that "federalism in 1990 continues to be a resilient and independent system" (1990:580). Both authors agree that a new conception of federalism needs to emerge, one that incorporates past elements of cooperative equity, competitive efficiency, and dual accountability. Federalism must also encompass the coercive elements of mandates, preemption, and fiscal incentives.

The purpose of the preceding sections has been to provide a general background and a larger framework in which to evaluate selected provisions of national wetlands regulations and programs. The following section shifts the focus to the state level, examining these provisions and their implications for national-state relations in wetland protection.

State Roles in Wetland Programs

Beginning with the 1850 and 1860 Swampland Acts, states have played a substantial part in carrying out federal laws related to wetlands. The Swampland Acts are early examples of an intergovernmental transfer of resources; they granted authority over 65 million acres of public-domain wetlands to the states for final disposition. Later examples include the 1937 Pittman-Robertson Act, and the 1950 Federal Aid in Sport Fisheries Restoration (Dingell-Johnson) Act. Under these Acts, the Fish and Wildlife Service administers tax revenues to the states for wildlife habitat acquisition. From 1937 to 1987, nearly 2 million acres of wetlands have been acquired under this program.

As noted in chapter three, the regulatory programs authorized by the Clean Water Act have become the primary governmental tool used to control the continuing loss of wetlands in the United States. The importance of federal and state relations and responsibilities under this Act, as well as provisions for partial preemption, are presented below.

The Clean Water Act

A major early component of this Act was the National Pollutant Discharge Elimination System permit program. This federal and state water pollution control program regulates point source discharges of pollutants. States have assumed primacy over this program, establishing minimum standards for treatment of municipal sewage. The Act also provided up to 90 percent of funding for the construction of these treatment facilities.

The Clean Water Act also contains "highly detailed provisions," found in Section 404(g), that allow states to voluntarily assume responsibility for operation of the Section 404 permit program (Burke 1988:21). This is a prime example of the federal use of a standard partial preemption statute, and has clear implications on

national-state relations. Under Section 404(g), states that have fulfilled specific criteria, and meet minimum standards, may assume the permit program for regulating dredge and fill activities in some waters within state boundaries from the Corps.

Section 404(g) was included in the 1977 Act as a congressional response "to the seemingly contradictory charges that the Army Corps of Engineers was not processing wetland fill permits fast enough and was failing to stem national wetland losses" (Davis 1991:6). It was generally believed that providing delegation authority to the states would expedite permit processing while also protecting wetlands. However, since this section was included in 1977, sixteen states have formally evaluated assumption, and 14 have rejected it. In 1984, Michigan took advantage of this provision, and New Jersey is currently attempting to be the second state to assume Section 404 regulatory authority.

Due to this overwhelming rejection, and because the reauthorization of the CWA is due to be a major task facing the 1993 federal legislative session, this issue has been addressed by several studies and papers which have attempted to determine the reasons behind state rejection of assumption. The Program Evaluation Division of the EPA has recently completed a final report, "Study of State Assumption of the Section 404 Program" (Office of Policy, Planning and Evaluation 1992). The EPA Wetlands Division, in preparation of revising the Section 404(g) regulations, commissioned this study to examine which obstacles to state assumption have been the most significant and to discover ways of encouraging future state assumption. This study reviewed eleven state feasibility studies on assumption, and conducted 25 interviews with representatives from thirteen states, the Association of Wetland Managers, three Corps of Engineers District Offices, and four regional EPA officials. The results of this effort outline the major concerns and problems faced by states who have evaluated assumption of the Section 404 program.

Advocates of state assumption generally support the concept of state administration and control of dredge and fill permit programs, including assumption of the Section 404 program. They believe that service delivery will be quicker at the state level, and that duplication of effort can be minimized. States also believe that their agencies have a more intimate knowledge of their own natural resources, and can therefore make more informed decisions than the federal level. Finally, states see

the regulation of dredge and fill activities as a program related to land use, which is more appropriately operated at the state level.

Obstacles to Assumption

The positive aspects mentioned above have not provided enough incentive for most states to pursue assumption. State officials surveyed cite many reasons for rejecting assumption; the major obstacles are funding, political and public support, existing legislation, federal requirements, and other existing options.

Funding The single, most significant obstacle cited by states for rejecting assumption was lack of funding from both federal and state sources. The costs of running an assumed program include both ongoing administrative costs, and initial or start up costs. Naturally, estimates of the administrative costs of assuming responsibility for the Section 404 program have varied from state to state. In 1988, the Wetlands Division estimated that the cost of operating an assumed program would be between $750,000 and $1 million per year for a typical state. Michigan, the only state to have actually experienced these costs, spent $1.3 million in 1989 on its wetland protection programs to safeguard nearly three million acres of wetlands (Davis 1991:7). Minnesota, when considering assumption in 1989, estimated that the costs for simply preparing for program assumption and meeting federal reporting requirements would be $67,400 annually. Preparation for assumption can take at least two years. Some states stated that they would also need to undertake mapping efforts to identify their wetlands, although this is not required by federal legislation.

The majority of states believe that without federal funding, assuming the 404 program would only overburden their regulatory agencies and exacerbate their own problems. They believe that if the EPA wants states to take responsibility for the federal dredge and fill program, then federal funding should be made available. Historically, when the EPA or other federal agencies have wanted states to undertake specific activities, the federal government has provided funding. Robin O'Malley, of the Council on Environmental Quality, states that "[t]he Section 404 process is the only instance in which a state may take over a federal environmental regulatory program, and not be eligible for federal assistance for running that program" (Office of Policy, Planning and Evaluation 1992:9).

Political and Public Support Another obstacle cited by many states is the lack of political support within their boundaries for assuming the program. Nine of the thirteen state officials interviewed in the EPA study indicated that the lack of political support in their state legislatures was a serious impediment to assumption. This lack of support is partially connected to the absence of federal funding, which forces states to attempt finding financial support from existing limited sources. However, many state legislators simply do not want their state to become more involved in what is seen as a highly controversial area. Wetland regulations are intimately connected to issues of private property rights, the public interest, and the current debate over wetland definitions. State decisions related to controversial wetland projects could alienate developers or environmental interest groups; states can avoid criticism of their decisions by letting the federal government operate the Section 404 program. Many states also relate this lack of political support to a deeper lack of public appreciation for the value of wetlands. While public awareness of wetland values is increasing, this has not translated into citizens putting pressure on state legislatures to become more involved in wetland regulation.

Existing Legislation Directly related to the political support in a state is the existence or adequacy of state legislation to authorize assumption. One of the existing prerequisites for assumption is existing state legislation that can provide at least as much protection for wetlands as the federal program (Davis 1991:6). Many states view this requirement as a formidable obstacle to program assumption. Some states claim to have most of the requisite legislation and expertise, but others indicate that they do not have legislation sufficiently stringent to warrant assumption. Nonexistent or inadequate state legislation is not always seen as a permanent problem. Two states that formally rejected assumption several years ago have begun to reconsider assuming the program and to pass or introduce preparatory measures in the state legislature.

Federal Requirements Connected to the existing state laws are other concerns relating to the requirements set by the federal level for state assumption. The majority of states in the EPA study expressed a concern that "EPA requirements and Clean Water Act provisions are inflexible," and advocated more flexibility in the design of an assumed program (Office of Policy, Planning and Evaluation 1992:10).

States with existing wetland regulatory programs believe that if their program substantially meets the intent of the federal program, they should not be required to change it.

Further, many states claim that a lingering federal presence after assumption would not streamline the process, but make it even more confusing. After assumption, the EPA is required to monitor the effectiveness of a state program. To meet this mandate, the EPA requires the state to submit annual reports and individual applications. In addition, the EPA retains final authority to override state decisions. EPA may review permit applications for compliance with federal guidelines, and can ask the Corps to reassert its authority to ensure permit compliance with those guidelines. The EPA has exercised this final authority only once, in the Crystal River case in Michigan. This case is outlined briefly below, to illustrate state concern over federal interference and because it "is sure to affect wetlands statutes and policies at both the state and federal levels" (Jones 1992:12).

The Crystal River Case

The Glen Lake area is located in the northwest corner of Michigan's lower peninsula. Connecting Glen Lake to Lake Michigan is a 6.5 mile portion of the Crystal River, which has been recommended for protection by both the state and the National Park Service. While serving on the local county planning and zoning commission in the 1970s, a local developer had purchased 267 acres of property in this area, including 87 acres of wetlands. In the late 1980s, having left the commission, this developer proposed to build a golf course and housing project in the Glen Lake area. Despite a unanimous decision by the county's planning commission to recommend that the project be opposed, the needed zoning amendment was approved by the township's board of trustees and the local planning and zoning commission. The proposed project was also approved by roughly 55 percent of voters in a public referendum.

The developer filed a permit application with the Michigan Department of Natural Resources (DNR) on January 6,1988. After review, the DNR denied the permit three months later, citing two reasons: the project potentially impaired water quality and the developer had not explored prudent and feasible alternatives in selecting the development site. By this time, four federal agencies had expressed opposition to granting the permit: the EPA's regional office in Chicago, the Army

Corps of Engineers, the Fish and Wildlife Service, and the National Park Service. The developer then appealed the DNR decision to the Leelanau County Circuit Court, and sought a review of the project. In what Scott Jones (1992:12), president of the environmental group Friends of the Crystal River, refers to as "a highly unusual order," the court called for a special hearing by the DNR.

After this February 1989 hearing, the DNR again denied the permit. However, based on new information, the DNR indicated that it would enter into a consent agreement with the developer, provided that he would follow a turf management plan and a surface water and groundwater monitoring program. The circuit court defeated this proposal by striking down the consent agreement and dismissing the suit. The developer then was able to pursue his case via a contested case hearing before a state administrative law judge. This hearing began in August 1989. Upon administrative review, the Michigan Natural Resources Commission ordered the issuance of a state Section 404 permit for the project in November 1990. The EPA Region V continued its objections to the project's permit and immediately transferred permitting authority in this case from the state to the Corps.

This case illustrates the paradox of the national government maintaining ultimate veto power over permits granted by states that assume regulatory authority of the Section 404 program. From the states' point of view, this federal veto power is seen as an obstacle which makes the entire process less certain and more confusing. From the national perspective, however, it would seem that in this case the system of checks and balances worked. The EPA used its oversight authority to prevent a state from allowing development that was likely to adversely impact wetlands.

Other Federal Involvement After state assumption, the Corps also retains Section 404 permitting authority over regulated activities in many nonassumable wetlands, including waters that are navigable, adjacent to navigable waters, or subject to the ebb and flow of the tide. This adds to the complications of assumption, because each state must determine which of its waters are assumable. This partial delegation has prompted some states to conclude that state assumption would not achieve the goals of streamlining the permit process or gaining state management of its own resources. A state-assumed program would also have to contend with requirements of related federal programs, such as the Corps' public interest review, the Fish and Wildlife Coordination Act's permit review process, and

the requirement of an Environmental Impact Statement mandated under the National Environmental Policy Act.

Comparison with Existing Options Many states believe that they have other opportunities to interact with and influence the Corps regarding the regulation of wetlands within state boundaries. These options include Section 401 authority, the use of a statewide general permit, and state wetlands laws.

Section 401 This section gives all states review and certification authority over "any federal license or permit" that "may result in a discharge into the Nation's waters," including wetlands. This provision allows states to condition or deny the issue of these federal permits if a state finds that water quality standards will not be met if the project is undertaken. Some states have used 401 authority to prevent the issuance of Corps 404 permits and other federal licenses (Burke 1988:21). In recent years, many states have been working toward building stronger 401 programs (Office of Policy, Planning and Evaluation 1992:13).

The general permit program A number of states have used 401 authority to deny state water quality certification of statewide and nationwide permits, which are issued for categories of activities that are similar in nature. Nationwide permit number 26, which was highlighted previously, covers discharges headwaters and isolated waters, including wetlands that are 10 acres or less in size and in which the flow is less than five cubic feet per second. By denying 401 certification for some general permits, the state is able to review related projects on an individual basis.

The Corps can also authorize issuance of State Program General Permits. States wishing to regulate navigable waters and adjacent wetlands could do so under a state permit program. The Corps has already issued state permits to four of the thirteen states interviewed for the EPA study. In addition, six other states indicated that they are considering pursuit of an SPGP as a means to gain greater control over permit decisions. Another factor to consider is that the Corps retains a greater oversight role under a SPGP than under state assumption. Section 404(e)(2) states that no general permit may be issued for more than five years, after which time it may be revoked or modified. Under assumption, state authority to implement the 404 program does not expire after a specific period of time.

State wetland laws In 1963, Massachusetts became the first state to regulate alteration of wetlands, passing a law requiring a permit for dredge and fill activities in tidal wetlands. The federal Coastal Zone Management Act of 1972 provided states with financial assistance to adopt coastal management programs, resulting in all coastal states providing some degree of protection for tidal wetlands. However, "relatively few of the 50 states have enacted specific nontidal regulatory laws" (Burke 1988:22). Thirty states have enacted tidal wetland regulatory programs; fourteen have programs covering nontidal wetlands. Several states, like New Jersey, have established state permit requirements to regulate activities in their nontidal wetlands. Several other states protect nontidal wetlands as part of broader regulatory efforts applying to state waters, floodplains, wild and scenic rivers, or other environmentally sensitive areas. The existence of these laws, and their implementation, is a contributing factor for many states to reject assumption of the federal 404 program.

Summary In addition to these obstacles to assumption, many states are concerned over the instability of the 404 program and the unresolved federal policy issues relating to wetlands, especially the current controversy surrounding the federal wetlands delineation manual. Clearly, the efforts of the EPA in conducting their study of state assumption is a step towards resolving the obstacles outlined. Another recent effort to aid states in assessing their role in wetland protection is the EPA's state grant program.

The Environmental Protection Agency's State Grant Program

In 1990, Congress appropriated funding to the budget of the EPA specifically to support the development and advancement of state wetlands protection programs. According to Lori Williams (1992:14), state program coordinator with the EPA's Wetlands Division, the purpose of these grants is to "support the initial development of state wetlands protection programs and the refinement and enhancement of existing programs." The criteria used to evaluate these projects are the likelihood of success, the existence and success of previous programs, the transferability to other states, and whether the project will result in direct, not speculative wetland protection. States are expected to provide at least a 25 percent finding match.

State agencies received a total of $1 million in 1990, $5 million in 1991, and $8.5 million in 1992. The EPA will again make $8.5 million available for 1993. This funding has supported a wide variety of wetland-related activities, including Section 401 water certification, mapping and classification, mitigation banking, public education, and establishing policy and program frameworks. One emphasis of funded efforts is the development of State Wetlands Conservation Plans. These statewide comprehensive plans are intended to "improve the effectiveness and efficiency of state government programs and private sector efforts to protect, restore, and create wetlands" (Williams 1992:14).

Another emphasis of some state initiatives is the development of watershed and regional wetlands management plans. These efforts advocate allowing federal, state, local, and private decisionmakers to cooperatively focus resources and establish priorities to address regional needs.

According to Williams, only Iowa and Nevada have not yet submitted a grant application for this funding (Williams 1992).

The Senior Advisory Group on Federal-State-Local Cooperation in Water Governance

This group has recently prepared a report that is certain to influence future relationships between all levels of government in the area of water governance, which has obvious connections to the future of wetland protection and management in this nation.

In December 1990, the U.S. Advisory Commission on Intergovernmental Relation officially adopted a report entitled "Coordinating Water Resources in the Federal System: the Groundwater-Surface Water Connection." The report's recommendations called for:

1) Better coordinated governance of water resources through state actions, interstate mechanisms, and federal restraint in mandating specific forms of coordination;
2) Incentives for and the removal of institutional barriers to the coordinated use federal agencies; and
3) Improved water resource research, information, and management training.

The Commission then convened a Senior Advisory Group on Federal-State-Local Cooperation in Water Governance. This Advisory group included an impressive list of prominent figures in the field, such as: Bruce Babbitt, former governor of Arizona; Robert Dawson, former Assistant Secretary of the Army for Civil Works and Associate Director of the Office of Management and Budget; Frank Ducheneaux, former Director of the U.S. Fish and Wildlife Service; Frank Gregg, former Director of the U.S. Bureau of Land Management; James Ziglar, former Assistant Secretary of the Interior for Water and Science; and others.

On March 19, 1992, the Advisory group officially approved and adopted a report which was endorsed by the Advisory Commission on Intergovernmental Relations in June, 1992. The report is divided into three major sections; principles, findings, and recommendations; which are presented below.

Principles

1) The nation's environmental well-being, economic development, and international competitiveness require strategically wise uses of the nation's finite and unevenly distributed surface and groundwater resources.
2) Development and use of the nation' diverse water resources have direct effects on ecosystems, and must be managed in a way to protect the long-term health of these ecosystems for the benefit of future generations while simultaneously meeting present water needs.
3) The nation's governments, systems of water rights, and administrative structures and procedures must be able to recognize and reconcile changing water needs and environmental requirements, and to create appropriate incentives for effective, efficient, and environmentally sound public and private use and conservation of water resources.
4) The federal government has the constitutional responsibility - and the responsibility as a landowner and water resources manager - to allow for and promote sound governance of water resources by state, tribal, and local governments.

Findings The report's section on findings summarizes three current issues. First, systems of water governance in many parts of the U.S. are insufficient to support the needs of the people in a timely, environmentally, economically, and socially

balanced way. Secondly, in some parts of the nation, the development and management of water resources have resulted in environmental change that may be inconsistent with ecosystem sustainability. Finally, the changing values and demands for the uses of water are creating serious conflicts among competing water uses.

The report suggests that inadequate governmental response to these issues may result from:

1) narrowly focused laws, organizations, programs, and regulations that invite polarization and inhibit collaborative problem solving; and
2) a lack of coordination mechanisms to help link federal, state, tribal, and local efforts to find solutions to water resource problems.

This section further states that the present process of governing our water resources sometimes leads to intergovernmental gridlock, an inability of the government to meet the nation's needs.

Recommendations Based on the above principles and findings, the Senior Advisory Group makes recommendations for federal responsibilities, state leadership, and interstate water basin governance.

1) Federal Responsibilities To become a more effective partner in helping solve the nation's water problems, the report recommends in part that the federal government should:

a) Establish policies, in consultation with other governments, that concentrate on flexible performance goals for ensuring healthy ecosystems throughout the nation - goals which recognize the diverse beneficial uses of the nation's finite water resources and differing situations in various parts of the country;
b) Rely on state, tribal, and local governments as the primary instruments goals that clearly can be best addressed by the national government;
c) Recognize regional, state, tribal, and local determinations of water needs, and accept local procedures for meeting those needs, except in the case of a clear violation of federal law;
d) Allow for administrative and regulatory structures that can provide sound protection of the environment and hydrologic systems by relying

on state, tribal, and local governments capable of working rationally with day-to-day problems;

e) Establish federal policies and institutions capable of consistent and coordinated exercise of federal responsibilities, and of meaningful communication with others in the federal system across the full range of water resource issues;
f) Assist the state, tribal, and local governments to improve their water resources planning and management capabilities, and provide incentives for them to do so;
g) Facilitate the establishment and effective operation of appropriate basinwide and interbasin cooperative bodies; and
h) Encourage research on improved technology-based approaches and information for protecting water and related environmental resources.

2) State Leadership To the extent that each state government demonstrates willingness, capacity, leadership, and commitment, the report recommends that the federal government should give the states authority to administer water quality, stream flow, wetlands, and related standards because;

a) States are chiefly responsible for water rights laws, water quality enforcement, empowerment of local water authorities, and many other water-related matters essential to resolving water problems within their boundaries; and
b) States have the proximity to water problems and the intimate knowledge and understanding necessary to exercise leadership in developing comprehensive water policies, systematizing water rights provisions, achieving water-related environmental protection goals, and bringing together all of the parties involved to resolve water disputes and negotiate innovative means of meeting changing water needs.

3) Interstate Water Basin Governance The report explicitly recognizes that many hydrologic systems, river basins, and groundwater aquifers extend beyond traditional state and regional boundaries. It states that governing these basins effectively requires the establishment of special intergovernmental agreements

and organizations with authority over water resource matters. To facilitate this establishment, the report suggests that Congress should authorize and approve the creation of interstate regional mechanisms, which will include interjurisdictional arrangements and be empowered to undertake the full range of functions necessary to achieve coordinated use and conservation. These interstate water resource coordination organizations should be: established pursuant to negotiations among the parties affected; self-governing; governed by representatives of affected state, tribal, and local governments, the federal government, and appropriate water interests; self-financing to the extent possible; and empowered to take effective action within the scope of responsibility agreed to.

Chapter Summary

The federal actions and recommendations outlined in this chapter clearly support the belief that the national government is basing its relationships with other levels of government on the model of cooperative federalism. The preceding sections are filled with terms that suggest this emphasis, like cooperation, collaborative, and coordinated. This emphasis is also clear in the calls for consultation and meaningful communication between all levels of governments.

The Senior Advisory Group's report also indicates that the federal government is attempting to move away from coercive forms of control over other governments. Two examples are the appeals for federal restraint in mandating specific forms of coordination, and the removal of institutional barriers to the coordinated use of water resources. This report's recommendations support Kincaid's assertion that the national government should combine cooperative federalism with concepts of efficiency, effectiveness, and equity. Examples are the suggestions for providing appropriate incentives for the effective, efficient, and environmentally sound use and conservation of water resources; and the finding that current systems of water governance in many parts of the U.S. are insufficient to support the needs of the people in a timely, environmentally, economically, and socially balanced way.

The EPA's state grant program and its study of state assumption are other clear examples of national and state cooperative efforts to help identify and eliminate state obstacles to assuming greater regulatory responsibility over their wetlands. One of the primary recommendations of the study is that the EPA should take steps to

facilitate a greater state role in wetlands protection. As the Clean Water Act moves toward reauthorization in the 1993 Congress, the EPA and the Corps are attempting to revise Section 404 provisions to better accommodate states to move toward this expanded role.

The EPA study further recommends that each state should determine, on an individual basis, how best to move toward having greater authority over their respective wetlands. They cite critical differences in each state that support this position, such as past consideration of Section 404 assumption, the political climate, the value and acreage of wetlands, the volume of permit applications, and the level of current wetlands activities. The study states that "no single approach for encouraging assumption can or should be imposed on each and every state" (Office of Policy, Planning and Evaluation 1992:18).

There are numerous additional reasons for evaluating the future of wetland protection on a state-by-state basis. States vary tremendously in the types and amounts of wetlands, the extent of existing legislation, state relations with the national and regional EPA and Corps agencies, state definitions of wetlands, the intensity of opinions on property rights, the level of public awareness and support, past land use policies, and local roles in wetland protection.

Based on these convincing arguments and reasons, the next chapter examines Iowa and it's wetlands to better determine Iowa state agencies' current and future role in wetland protection programs.

WETLANDS IN IOWA

Because there are convincing reasons for each state to evaluate its own future role in wetlands protection, the purpose of this chapter is to examine selected aspects of past and current wetland-related activities in Iowa. These reasons, such as the differences in the types and amounts of wetlands, the extent and scope of existing state regulations and acquisition programs, related state environmental laws, and the political climate, provide a useful outline for this examination.

The initial sections of this chapter describe regional characteristics and Iowa's historical activities, then discuss state wetland losses, current amounts, wetland types, and some of the native species which are wetland-dependent.

Iowa's wetland protection efforts, both regulatory and acquisition programs, are highlighted next. One emphasis of regulatory efforts in the state is related to the Clean Water Act and the obstacles to assumption already presented, including past consideration of Section 404 assumption, Iowa's Section 401 program, and state review of the general permits promulgated by the Corps of Engineers. Acquisition programs include Iowa's participation and role in programs initiated by the federal government, state programs, and other projects involving state, local, and private groups.

Other factors influencing Iowa's future role are then discussed, such as the state's political climate, related environmental laws, the level of public awareness and support, the intensity of opinions on property rights, and local roles in wetland protection.

Regional Characteristics

A significant portion of Iowa is part of the Prairie Pothole region (see Figure 3, page 25), which encompasses over 300,000 square miles from the Canadian provinces of Alberta, Saskatchewan, and Manitoba through Montana, Minnesota, and the Dakotas. The wetlands in this region were essentially carved out by glacial retreat nearly 13,000 years ago. The Des Moines lobe of the Wisconsin glacier marks the region's southeastern tip in central Iowa. These glaciers and their extensive moraines left behind millions of small sloughs and marshes which characterize the region.

The region as a whole contains the most productive breeding grounds for waterfowl on the continent, producing over half of the continent's ducks. Due to its rich soils, however, wetland habitats were often sacrificed to open more areas to cultivation, and the region soon became a major producer of corn, sunflowers and hard red spring wheat. It is estimated that over 50 percent of the region's wetlands that existed at the start of this century have been lost to agricultural use. These estimates are taken from the best available sources, based in large part on aerial agricultural surveys conducted by the USDA in the 1950s.

Iowa

Much of the information relating to the history of wetlands in Iowa is taken directly from the chapter "Wetlands" in the 1982 book *Iowa's Natural Heritage* , which was co-authored by Richard Bishop, wildlife bureau chief for the Iowa Department of Natural Resources (DNR), and Arnold Van Der Valk, Professor of Botany at Iowa State University. Current wetland amounts are taken from personal communications with Mr. Bishop and Lee Gladfelter, DNR special projects coordinator. This section will provide a summary of the information from these sources.

Historical activities

In north-central and northwest Iowa, glaciers leveled the land and gouged out holes and basins that were filled with water when the ice masses retreated. The first pioneers crossing the Mississippi River were confronted by the awesome spectacle of a vast 7.6 million acre prairie-marsh-pothole complex. It is estimated that by the early 1800s, six million acres of this prairie and marsh mixture remained. Exact acreages of wetlands are difficult to specify, but it is estimated that "at least a third of the area," or roughly 2.3 million acres, would be classified as a wetland (Bishop 1982:223).

Settlers in Iowa plowed the prairie for farming, exploited the seemingly endless supply of wildfowl populations, built towns and cities, and Iowa officially became a state in 1846. Throughout this period of settlement, the extensive wetlands remained virtually undisturbed due to the obvious difficulties involved with using these areas for other development. This changed, however, beginning with the passage of the Swampland Acts of 1850 and 1860. These federal actions granted 1,196,392 acres of public-domain wetlands to Iowa for "swamp reclamation." This land was then turned

over to the counties, where it was "bartered for public buildings, bridges, etc., and in some cases was sold for 25 to 75 cents an acre" to immigration companies (Bishop 1981:11). In 1862, the Morrill Act established the system of land-grant universities, another example of intergovernmental resource transfers. The combination of these Acts led to the elimination of hundreds of wetland acres in central Iowa in an area referred to on mid-19th century maps as the Dismal Slough , where Iowa State University now stands.

The "most influential action that led to the alteration of Iowa's wetlands" was the establishment of drainage districts by the Iowa legislature (Bishop 1982:223). This legislation gave Iowa's 99 county governments the jurisdiction and authority to establish drainage districts and levees to drain, straighten, widen, deepen, or change any natural water course whenever such action was determined to be of public utility or conducive to public health, convenience, or welfare. The act further declared that the drainage of surface waters from agricultural lands and all other lands shall be presumed to be a public benefit, and therefore conducive to health, convenience, and welfare.

Closely linked with drainage is the practice of tiling, another action that led to further loss of Iowa's wetlands. Underground tiles carry water to drainage ditches or creeks, which in turn goes to rivers and streams, aiding the drying process. The function of wetlands as water storage bodies was drastically changed by drainage and tiling, upsetting natural hydrological systems. The rivers and streams could not cope with the additional runoff, and severe flooding resulted.

Channelization of streams and rivers was undertaken to allow water runoff to escape faster, and flood-control reservoirs were constructed for water storage. This alteration clearly had damaging effects on many riverine wetlands throughout Iowa. Bishop uses the channelization of the Missouri River as an example, stating that "this once wide, meandering river was converted to a fast-flowing narrow drainage ditch" (Bishop 1981:14).

It should again be made clear that these federal, state, county, and local activities were consistent with the prevailing public perceptions of the time, that wetlands were wastelands which should be altered for more useful purposes. As our society became more aware of the importance and functions of wetlands, this view changed and public activities became more focused on wetland protection and preservation.

Two important events triggered early wetland protection efforts in Iowa "in the face of an aggressive and demanding agricultural system" (Bishop 1982:224). First, 65 lakes and marshes were declared sovereign lands of the state in 1935, giving state agencies control of, and authority over, these natural resources. The second event was the passage of the Pittman-Robertson Act of 1937, which established an excise tax on sporting goods and ammunition. With a portion of the funds provided to the state by this act, the Iowa Conservation Commission was able to directly purchase wetlands in danger of being drained, or too wet for farming. This was a precursor to the many past and ongoing acquisition programs in Iowa, which are presented in a later section.

Wetland losses

As a result of these actions, wetland inventories conducted by the U.S. Department of Agriculture estimated that wetlands in Iowa were reduced to 930,000 acres by 1906, and to 368,000 acres by 1922. In 1938, it was estimated that only 50,000 acres of "prime marshland" remained; literally millions of wetland acres were lost to agriculture and urban development (Bishop 1982:223).

The continued dominance of agricultural land use in Iowa can be illustrated by the percentage of land devoted to farming activities. Iowa contains a total area of 56,375 square miles, or 36,080,000 acres. In 1986, the total amount of land was 99.3 percent of this total area . The land devoted to farming was 33,600,000 acres, which is over 93 percent of Iowa's total area (Worldmark Encyclopedia 2nd edition 1986).

The Fish and Wildlife Service estimates that 421,900 acres of wetlands exist in Iowa today. However, according to Lee Gladfelter (1991), only 35,000 acres of 'true' wetlands (palustrine marshes and prairie potholes) now exist. The Service's estimate is significantly larger due to its inclusion of the surface area of Iowa's lakes, rivers, reservoirs, ponds and lagoons. Of these 35,000 remaining wetland acres, all but 5,000 are under public ownership and control.

Wetland types

Clearly, all of the wetlands found in Iowa are nontidal, inland wetlands. The three major types present in the state are: lacustrine, riverine, and palustrine.

As noted earlier, lacustrine wetlands are found in the shallow protected areas of lakes. Examples of this type can be found along the shores of Spirit Lake, Clear Lake, and many smaller Iowa lakes.

Some riverine wetlands, associated with rivers and their flood plains, are still present in Iowa. During its channelization, the Missouri River lost most of its valuable backwaters and marshes. However, on Iowa's eastern boundary, the creation of the lock and dam system on the Mississippi River "created some excellent river marshes in its upper portions" (Bishop 1982:225). Unfortunately, even though much of this area is under public ownership, the marshes and lakes found along the upper Mississippi are still threatened by siltation and channel dredging for navigation. Most other rivers in Iowa today are too turbid to support the growth of aquatic plants, but some riverine wetlands can be found. Bishop (1982:225) states that "Allamakee and Clayton counties boast the most valuable and picturesque river ponds and marshes."

The majority of wetlands in Iowa are palustrine, occupying shallow basins with small watersheds. Palustrine wetlands in Iowa are commonly called prairie potholes, marshes and wet meadows. Wetlands of this type were once common in the glaciated northern half of Iowa, but most have now been drained. The area in Iowa that is part of the Prairie Pothole Joint Venture contains the best examples of palustrine wetlands; this area will be highlighted in a later section of this chapter. The classification system used in *Circular 39* (see chapter 2) characterizes 20 different wetland types. Types one through six are found in Iowa; these classifications are still used by state agencies. In keeping with the larger wetland framework already presented, types one to four are palustrine wetlands, type five are lacustrine, and type six are riverine. The three parameters of hydrology, the presence of hydric soils, and the extent of hydrophytic vegetation, are incorporated in these six types:

> **Type 1** includes seasonally-flooded basins, areas periodically flooded during heavy rainfall or snow runoff. Type 1 wetlands are found in upland depressions and overflow bottomlands, where the soils are often saturated but usually well drained. The vegetation varies with the length of time flooded, but usually includes smartweed, wild millet, fall panicum, sedges, ragweed, and barnyard grass. These wetlands are very valuable to breeding waterfowl because they provide abundant food and areas for breeding pairs to seclude themselves during the early nesting period. They are also used extensively by migrating waterfowl.
>
> **Type 2** wetlands are fresh meadows. The soil is without standing water for most of the growing season, but is saturated within a few inches of the surface.

In years of heavy rainfall, these areas temporarily hold water and provide breeding spaces for waterfowl. The vegetation is characterized by prairie cordgrass, reed canary and manna grass, sedges, and rushes. In late summer, these wetlands are sometimes cut for hay when the surface water is gone.

Type 3 wetlands are fresh water marshes whose soils are usually saturated in the growing season, and are often covered by six or more inches of standing water. Vegetation includes grasses, bulrushes, spikerushes, cattails, arrowhead, smartweed, and sedges. These areas hold water in the early spring nesting and brood-rearing periods for waterfowl, but often dry out in late summer.

Type 4 wetlands are the deep freshwater marshes. Their basins are covered with six inches to three feet or more of water during the growing season. The common vegetation includes those listed under type three, and adds plants common to deeper water areas such as pondweeds, coontails, waterlilies, watermilfoil, and duckweeds. These wetlands provide nesting waterfowl with a more dependable water supply. The emergent vegetation also offers young waterfowl cover from predators.

Type 5 areas include open fresh water, lakes, and ponds. The water is usually less than ten feet deep and is fringed with emergent vegetation. Water fowl use these wet habitats for brood-rearing, especially in later summer when shallow, less permanent wetlands dry up. They are used extensively by waterfowl during migration.

Type 6 wetlands are shrub swamps, which are most common in river flood plains where flooding has scoured out low-lying areas. These overflow areas are usually covered by six inches or more of water in the growing season. Vegetation includes willows, buttonbush, and maples. Many acres of overflow and shrub swamps still exist along Iowa's interior rivers.

Wetland species

Many types of waterfowl, other birds, fur-bearing animals, and game fish in Iowa are dependent on wetlands for nesting, breeding, shelter, and as a source of food and water. In addition to the vegetation listed above, a variety of other plant species, amphibians, and insects are also clearly bound to these wet habitats. The following

excerpts from *Iowa's Natural Heritage* provide vivid and colorful examples of the many species of plants and animals found in Iowa's wetlands:

> When March and April winds melt the ice along the shallow marsh edge, another life cycle begins. Some of the first to return are red-winged blackbirds and mallard ducks. Close behind, a host of other ducks - pintail, green-winged teal, shoveler, wigeon, scaup, redheads, and canvasbacks - follow. Snow geese, Canada geese, and white-fronted geese can also be seen. Frogs soon serenade the homecoming and the announcement of spring. Yellow-headed blackbirds, Virginia and sora rails, coots, terns, herons, marsh hawks, more ducks, and a host of wading birds arrive shortly after. No other habitat seems so alive . . .
>
> Small mammals are active also. Muskrats busily swim along, appearing to be going somewhere in a hurry. Mink dart along the marsh edge, looking for a meal in this new time of plenty. Raccoon tracks show where they have searched for frogs and crayfish. Other animals - red fox, badger, skunk, opossum, ground squirrel, and meadow voles - can be seen in the uplands along the marsh.
>
> Green cattail shoots spring up from the old root stalks, giving the marsh a greenish cast marsh iris lift purple heads . . .
>
> Hot summer days find the marsh more subdued, except for the chatter of coots and rails, the flights of blackbirds, and the dipping and diving flight of the tern. Broods of ducklings can be seen in open-water areas in early morning or late evening busily eating a high protein diet of insects . . . The buzzing of millions of insects can almost deafen you and make your stay uncomfortable, but that is part of the marsh (Bishop 1982:226).

In 1988, the Iowa DNR compiled a list of over 700 species of plants and animals which utilize wetland complexes; many of these species are currently endangered. Of the 152 plant species listed as threatened or endangered in Iowa, 43 percent are wetland-dependent (Mason 1988:11). It is estimated that from 25-to-30 percent of the animals currently listed as endangered in the state also depend on wetlands for at least a portion of their life cycle.

Wetland Protection Efforts

The Iowa Wetlands Protection Plan

In 1988, the DNR prepared and published the Iowa Wetlands Protection Plan, for the following cited reasons:

1) To document wetland losses.
2) To inform and educate decision-makers on the value of wetlands.
3) To delineate priorities for protection, restoration, and management of wetlands in Iowa.
4) To provide a vehicle for improved communications between entities involved or concerned with wetland protection.
5) To identify protective mechanisms available, and develop funding sources to protect and restore wetlands. (Iowa DNR 1988a:3)

The plan also states that "[t]he basic goal for wetland protection in Iowa is to assure that all remaining high-quality wetlands are protected in perpetuity" (Iowa DNR 1988a:3). Clearly, the term "high-quality" is very subjective, so the plan bases this designation on considerations of a wetland's size, degree of permanence, public accessibility, fish and wildlife benefits, recreational and educational benefits, provision of habitat for threatened and endangered species, adjoining upland wildlife production capabilities, and the presence of special plant communities. A companion goal is the restoration of areas that formerly contained wetlands but are currently being cropped.

The Plan is an official supplement to the Statewide Comprehensive Outdoor Plan (SCORP). SCORP is a document required by the federal Emergency Wetlands Resources Act of 1986, which says, in part, that state plans are to be consistent with the National Wetlands Priority Conservation Plan prepared by the U.S. Fish and Wildlife Service.

The Plan includes a review of the major federal wetland laws presented in chapter three. Many Iowa laws related to wetlands are also discussed in sections of the Plan, to get a comprehensive picture of state roles. These related laws, from the Code of Iowa, include:

Chapter 107 - General powers and authorities of the Natural Resource Commission

Chapter 108A - Iowa Protected Water Areas Program
Chapter 109 - Fish and game conservation
Chapter 109A - Threatened and Endangered Species
Chapter 110B - Migratory Waterfowl Stamp
Chapter 111 - Conservation-Public Lands and Water
Chapter 111A - County Conservation Boards
Chapter 111B - State Preserves System
Chapter 111C - Public use of private lands and water
Chapter 111D - Conservation Easements
Chapter 427.1(36) - Property tax exemptions for natural or wildlife areas

Other related Iowa laws include H.F.620, Open Spaces Planning; H.F.631, the Groundwater Protection Act; and H.F.575, the State Trails Plan. The plan also devotes attention to Iowa's role in the Prairie Pothole Joint Venture. The recommendations of this plan will be returned to in the concluding chapter of this thesis.

Based in part on the programs and activities addressed by this plan, the remainder of this chapter highlights and updates the current role of Iowa agencies in selected acquisition and regulatory programs, which have been initiated by both federal and state legislation.

Acquisition Programs

Two important events triggered early wetland protection efforts in Iowa "in the face of an aggressive and demanding agricultural system" (Bishop 1982:224). In 1965, 65 lakes and marshes were declared sovereign lands of the state, giving Iowa agencies control of, and authority over, these natural resources. The second event was the passage of the Pittman-Robertson Act of 1937, which established an excise tax on sporting goods and ammunition. With a portion of these funds, provided to the state by the federal government, the Iowa Conservation Commission was able to directly purchase wetlands in danger of being drained.

Since these early acquisition efforts, many other wetland acquisition and restoration programs have been initiated in Iowa by federal, state, and local governments and by private conservation groups. Before examining the role of state agencies in Iowa in the implementation of specific programs, the following section will look at the history of the Green Island Wildlife Area. The evolution of this wetland

development in this area provides an excellent example of general state activities, and state relationships with federal and local government, from the 1950s to the 1990s.

The Green Island Wildlife Area Located in eastern Jackson County, this refuge includes land on the northern edge of Iowa's Big Bend region. It encompasses a 4,000 acre delta, including 700 acres of prime wetlands, which was created at the junction of the Mississippi and Maquoketa rivers. Roughly two-thirds of the wildlife area were purchased by the federal government when the lock-and-dam system was constructed along the Mississippi River in the 1930s. The Iowa DNR studied the area's potential and requested permission from the national government to manage Green Island. The state was granted this authority in 1954.

In a recent article, Robert Sheets, DNR wildlife management biologist, explains the "insurmountable problems" which "seemed to face the area" after 1954 (Sheets 1992:55). The major problem was that the marsh acres were totally dependent on Mississippi River levels and rainfall amounts, for two reasons: the six-mile levee that was crucial to water level management was overgrown with trees and in poor condition, and timely adjustment of the water control structure was problematic because personnel were located 70 miles away.

Iowa DNR staff estimated that an additional 1,400 acres could be created with the construction of another dike and a three-foot increase in water level. This planned action led to additional obstacles: a cooperative agreement needed to be reached with the local drainage district, and additional land would have to be purchased from private landowners. These plans were temporarily shelved, "[d]ue to the magnitude of the task and other funding commitments" (Sheets 1992:55). Over the years, the DNR became heavily involved with other projects and activities, such as managing other wetlands on the federal Red Rock and Rathbun reservoirs, Canadian goose restoration projects at these reservoirs, the Ingham High marsh complex in northwest Iowa, and the planning and development of Forneys Lake and Riverton marsh in southwest Iowa.

In 1965, flooding along the Mississippi caused serious damage. The next year, the Army Corps of Engineers notified DNR officials that the Green Island levee required immediate repair. To accomplish this goal, a unique intergovernmental agreement was made between the national Corps, the state DNR, and the local drainage district. The Corps offered to rebuild the levee if the district and the DNR would clear

the timber from the dike. In 1967, levee maintenance was finished and one major obstacle had been overcome by cooperation.

The next significant action was the completion of a feasibility study on further development in the Green Island area, which included a recommendation that 500 additional acres be acquired to develop wetlands. A meeting in 1975 with adjacent landowners indicated that they were not interested in selling at that time. After the first land acquisition was made in 1976, personnel and equipment were moved to Green Island. Other problems were solved in 1978 when a complete development plan was prepared, the project was approved, and the DNR reached a settlement with several landowners. In 1980, an agreement establishing higher fall water levels for the proposed wetlands was made between the DNR and the drainage district.

Design and engineering work for the project was completed in 1988, but plans were again shelved because of funding constraints. Then, in 1989, "a very significant happening took place in the Iowa legislature" (Sheets 1992:55). This was the passage of the Resource Enhancement and Protection bill (REAP), which is detailed in a later section. REAP was originally intended to provide $30 million annually for park and wildlife development projects by state and local governments, as well as private resource enhancement projects. The DNR immediately presented the Green Island Development Project as their number one priority. Although it has taken 35 years, the many improvements in the Green Island area are now nearing completion. It is expected to become one of the finest wetland-waterfowl complexes in Iowa.

The Walnut Creek National Wildlife Refuge As outlined in chapter three, this refuge in central Iowa will be incorporated into the National Wildlife Refuge System. Congress appropriated $6 million in 1990 to purchase land on a willing-seller basis, and acquisition for the project has begun with the purchase of 3,587 acres formerly owned by the Iowa Power Company. This land provides the central core of a proposed 8,626 acre refuge. The refuge goals include restoring, developing, and managing wetlands, and creating and improving habitat for waterfowl, shorebirds, other migratory birds, and resident wildlife. The Iowa DNR is actively involved in this project, working closely with the Fish and Wildlife Service in its development.

Other national refuges in the state are the Upper Mississippi River National Wildlife and Fish Refuge, the Mark Twain Refuge along the southern part of the

Mississippi, The DeSoto National Wildlife Refuge along the Missouri River, and Union Slough in Kossuth County in north-central Iowa.

Duck Stamp programs In 1981, there were two programs "in operation to save prairie marshes" (Bishop 1981:16). These programs continue to provide funding to purchase wetlands for waterfowl production. First, all waterfowl hunters age 16 and over are required to purchase a federal duck stamp. The cooperative state and federal program involves the Service and the Iowa DNR; it utilizes these funds to acquire wetland habitats.

Iowa passed a similar state law in 1972, requiring all waterfowl hunters to purchase a $1 state duck stamp. In 1979, the law was changed to require hunters age 16 and over to purchase a $5 stamp. From 1979 to 1981, approximately $275,000 to $300,000 annually was spent on wetland acquisition and development, with 15 percent of the funds going to Ducks Unlimited in Canada to create waterfowl production areas (Bishop 1981:16).

The Wetland Restoration Program The Conservation Reserve Program (CRP), established by the 1985 Farm Bill, has been the impetus for the Iowa DNR's Wetland Restoration Program. Begun in late 1987, the DNR contacts individual farmers who have enrolled former wetland areas into the CRP. They offer financing and technical services to restore the wetlands.

These restoration efforts are relatively simple. Working with local county conservationists, old drain tiles are broken and a small dike constructed. Within two years, the dormant wetland plants return. The resiliency of these dormant seeds is truly amazing; studies have documented that "the seeds of wetland plants can remain alive for over 100 years . . . on the bottom of the marsh" (LeGrange 1988:15). Through 1990, the DNR had restored 1,582.7 acres of wetlands at a cost of $225,000.

The Wetland Reserve Program The 1992 pilot reserve program was discussed in chapter four. Over 750 farmers in 88 of Iowa's 99 counties have submitted plans to enroll over 43,000 acres into the program. This amount is more than the total number of current wetland acres in the state. The Iowa Soil Conservation Service and the ASCS are currently reviewing these applications. This initial response indicates that state agencies should advocate the restoration of funding for this program.

The Prairie Pothole Joint Venture The Prairie Pothole Joint Venture (PPJV) is a partnership between federal, state, and local agencies and private groups in Minnesota, Montana, North and South Dakota, and Iowa. At the regional level, specific programs or initiatives are not outlined. The broad guidelines and goals presented previously have led to many projects involving restoration, education programs, habitat acquisition, and improved wildlife management techniques. While both the Plan and the PPJV provide an umbrella under which a proper perspective of larger goals and inter-relationships can be addressed, it is at the grassroots level that the real work is being done.

The Iowa portion of the Joint Venture region encompasses 35 counties and is divided into two plan areas, as delineated by the Iowa Department of Natural Resources (1988b and 1988c). One plan focuses on the four counties of Clay, Dickinson, Emmet, and Palo Alto, where many of the state's best natural wetlands were once found. The remaining 31 counties comprise the other plan (see Figure 4).

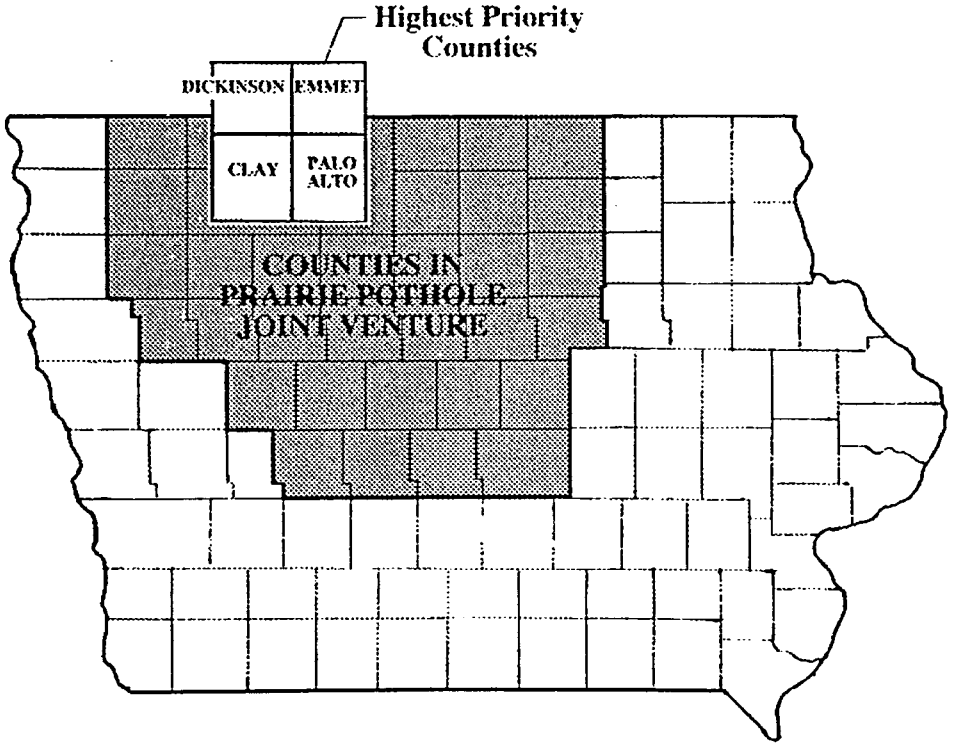

Figure 4: Iowa PPJV Project Areas
(Iowa Department of Natural Resources, 1988)

Goals With only 5,000 acres of Iowa's remaining wetlands in private ownership, one objective of this plan is for the Iowa DNR to directly purchase these areas from willing sellers to provide permanent protection. Another opportunity is the restoration of wetlands previously drained for agricultural use. DNR biologists have estimated that as much as 15 percent of Iowa's original wetland acres could be restored, providing a potential of 300,000 acres that could be put back into production of waterfowl and other wildlife dependent on wetlands.

The two reports referred to above also set forth specific goals for Iowa's participation in the PPJV, which are to:

1) acquire a total of 30,000 acres of land in the 35 counties over 15 years at a rate of 2,000 acres per year. (The 4-county area noted earlier contains half of this combined total.)
2) raise $2 million each year for land acquisition through donations from county, state and federal governments, conservation organizations, private businesses and concerned citizens.
3) acquire existing or restorable wetlands and adjacent upland habitat at a ratio of three upland acres per acre of wetland.
4) continue an aggressive restoration program on private land.
5) manage new wetland areas by controlling water levels, manipulating upland nesting cover, constructing waterfowl nesting structures, and managing predators in key production areas.
6) create coordination and implementation committees consisting of members from governmental agencies and supporting organizations to raise funds, disseminate information to the public, and induce political and public support for the project.

Implementation The task of fundraising is undertaken by a Wetland Coordinating Committee that contains representatives from many of the public agencies and private groups dedicated to preservation of wetland areas. This committee is also responsible for disseminating information to member groups, maintaining political support, and providing a direct link to the public.

Staff from the Iowa DNR, together with each county conservation employees, do the actual field work in acquisition and restoration efforts. A DNR Coordinating committee keeps information flowing between field staff and administrative staff. Review of project proposals and implementation of management practices are important activities of this committee. A DNR Technical Committee provides research data to administrators and the public relating to habitat management and waterfowl production techniques. Members from Iowa are also included in various committees for the administration of the entire prairie pothole region.

Costs The major challenge of this program is raising the necessary funding. It was originally estimated that the cost of acquiring the goal of 30,000 acres over 15 years would cost $1.8 million per year. To raise this funding, the costs were originally planned to be apportioned as shown in Table 2.

Table 2: Proposed annual contributions for the Iowa PPJV
(Iowa Department of Natural Resources 1988b)

Plan Partners	Contributions
Fish and Wildlife Service	$800,000
Iowa Department of Natural Resources	300,000
Conservation organizations, individuals, corporations, and others	700,000
Total	$81,000,000

Progress According to Lee Gladfelter, the four-year Iowa program has directly purchased over 8,000 acres of existing wetland areas (see Table 3). However, this figure includes upland nesting cover at the 3:1 ratio as outlined in the goals above. Some restoration projects are also underway, but these are primarily focused on private lands under the federal Conservation Reserve Program. As indicated in Iowa's goals, this restoration program began prior to the state's involvement in the PPJV.

Table 3: Acquisitions and Costs of Iowa PPJV
(Lee Gladfelter 1989)

Year	Number of acres	Costs
1987 to 1988	3,103	$ 1,700,000
1989	2,180	1,800,000
1990	2,736	2,900,000
Total	8,019	$ 6,400,000

Table 3 shows the actual costs of funding this program. The 1989 figure is exactly what was originally expected, but the program enlarged significantly in 1990. To illustrate the involvement and commitment of various groups in the program, contributions by source for 1990 are as follows:

US Fish and Wildlife Service	$1,000,000
Iowa DNR (REAP funding)	825,000
State and County Habitat Stamps	350,000
State Waterfowl Stamp	150,000
Ducks Unlimited	130,000
Pheasants Forever	90,000
Wetlands for Iowa	81,000
County Conservation Boards	30,000
Okiboji University Foundation	20,000
Okiboji Protective Assoc.	30,000
Nature Conservancy	7,000
Private Individuals	20,000
1990 TOTAL	$2,900,000

In addition, a donation of land valued at $160,000 was offered by a private landowner. The large number of public and private efforts is a testament to the

importance that Iowans have placed on preserving what little remains of our original wetlands.

The Resource Enhancement and Protection (REAP) fund contribution has been critical in past years, but its future is now in doubt due to Iowa's current budget problems. The Fish and Wildlife Service has budgeted $1 million for Iowa PPJV projects in 1992, but this requires matching contributions which are now unsure.

Easements Recently, 65 acres of marsh were restored near Ruthven, Iowa, under an easement program established by the Service. This program pays landowners a fee for a perpetual easement to preserve a wetland. The owner agrees not to drain, burn, or fill the area , but is allowed to use the site for normal grazing or cropping if weather permits. The funding for these easements comes from the federal duck stamp program; the current price of these required stamps is $15. Neil Heiser (1992), the DNR's wildlife supervisor for northeast Iowa, states that wetland easements have been used in Minnesota and the Dakotas since the late 1950s, but this is the first time the plan has been used to protect wetlands in Iowa. Heiser further states that other applicants are currently awaiting federal approval.

In addition to the use of these programs to acquire and restore wetlands, Iowa is actively involved in a host of regulatory efforts.

Regulatory programs

This section first addresses the role of Iowa in the major wetlands regulatory programs initiated by the national government, then turns to regulatory programs related to state legislation.

The Clean Water Act As noted in chapter three, Section 404 of the Clean Water Act provides the authorization for the primary federal program regulating activities in wetlands. Section 404 (g) contains provisions which allow the states to assume authority of the Section 404 permitting program.

Richard Bishop (1992), wildlife bureau chief of the Iowa Department of Natural Resources, recalls "making a pitch" in the early 1980s for the state to assume the 404 program. This preliminary contact with the Corps included an appeal for

funding, but assumption was rejected due to the primary reason revealed in the EPA assumption study, lack of adequate funding and personnel.

Darryl McAllister (1992), of the DNR's water quality division, has expressed interest in examining the efforts and experience of Michigan and New Jersey, and in the EPA state grant program, but again stated that there is no staff or budget available to pursue this research. As noted previously, Iowa is one of only two states which have not yet applied for this federal funding.

Section 401 This section gives states review and certification authority over any federal license or permit that may result in a discharge into the nation's waters, including wetlands. Section 401 allows states to condition or deny the issue of these federal permits to protect state water quality. Some states have used 401 authority to prevent the issuance of Corps 404 permits.

In Iowa, as part of the Section 404 permit process, an applicant must obtain 401 certification from the DNR to make sure that the activity complies with Iowa's water quality standards. State enabling legislation for this program is found in chapter 61 of the Code of Iowa. The primary standard which applies to the state 401 certification program is the antidegradation policy [Code of Iowa, chapter 61.2(2), subrule 567], which states in part:

> g. It is the intent of the antidegradation policy to protect and maintain the existing physical, biological, and chemical integrity of all waters of the state. Consistency with Iowa's water quality standards requires that any proposed activity modifying the . . . integrity of a water of the state shall not adversely impact these resource attributes, either on an individual or cumulative basis.

An adverse impact is defined as:

> The loss of or irreparable damage to the aquatic, semiaquatic, or wildlife habitat or population, or a modification to the water body that would cause an overall degradation to the aquatic or wildlife population and diversity. Exceptions to the preceding will be allowable only if full mitigation is provided by the applicant and approved by the department.

Section 401 also has an impact on the Corps' general permit program.

The general permit program In the previous chapter it was observed that a number of states have used their 401 authority to deny state water quality certification of nationwide permit number 26. Iowa is one of these states. When the Corps first promulgated nationwide permits in the early 1980s, the state certified the then proposed 26 permits, with the exception of permits 18, 23, and 26. The controversy surrounding permit 26 was referred to in chapter three. Iowa's position was that many of its significant water resources, such as smaller wetlands and streams, would escape adequate regulation under these nationwide permits if such projects were not reviewed on a case-by-case basis.

In the summer of 1991, the Iowa Department of Natural Resources hosted a series of public hearings on a proposed amendment to chapter 61 of the Iowa Code; this amendment was to certify or deny Section 401 certification of the 1991 revisions to the general permit program of the Corps, which went into effect in January 1992. The author attended the public hearing held at the Wallace State Office building on August 5, 1991. In January 1992, all participants received a copy of the *Public Participation Responsiveness Summary*, and the Environmental Protection Commission's adopted and final rule (Iowa Department of Natural Resources 1992).

These documents state that the DNR generally concurs that most of the 40 proposed national permits will help insure that Iowa water quality standards will not be violated. However, others were denied completely, and some were placed in a new category as conditionally certified. The Commission's adopted rules are now incorporated into chapter 61 of the Iowa Code.

The state is currently developing the use of regional permits under some of the 40 permit categories, which will further two goals of the general permit program, to minimize paperwork and duplication, and to streamline the overall permitting process.

The Clean Water Act's wetland provisions only cover dredging and filling activities; they allow exemptions for agricultural activities. The drainage of wetlands in Iowa for agricultural uses has been the primary cause of their drastic loss in the state. The Farm Bills' swampbuster provisions address this issue.

Swampbuster Earlier, information was presented showing that the land devoted to farming in Iowa in 1986 was 33,600,000 acres, which is over 93 percent of Iowa's total area. A study released by the USDA in June, 1992, shows that the number of farms in Iowa is now 107,000, the third largest of all states (Associated

Press 1992:7C). Because of the vast amount of land devoted to agriculture in Iowa, its farming tradition, and agricultural ties to the Iowa economy, the swampbuster provisions of the 1985 and 1990 Farm Bills related to wetlands are clearly important. These provisions were fully detailed in chapter three; this section will concentrate on the impact of these acts on Iowa. Classification and wetland determination efforts are implemented by the Iowa Soil Conservation Service (SCS), while violations and enforcement are done by the Agricultural Stabilization Conservation Service (ASCS).

The effort by Vice President Quayle and the Council on Competitiveness to extend the number of days standing water must be present to be a wetland has stalled determinations and identification efforts in Iowa. The Iowa SCS received a directive from the national headquarters in May of 1991 to suspend this process until the controversy is resolved (Musel 1990). It is not yet clear what effect this will have on swampbuster, and determinations are still proceeding on a case by case basis.

From the effective date of the 1985 bill until December of 1990, only ten violations were filed in Iowa, resulting in $75,000 of benefits being withheld. At first glance, these numbers seem relatively minor in a state that has lost over 99 percent of its original wetlands, largely because of conversion to cropland. Others, however, believe that the swampbuster provisions have "helped greatly to slow wetland drainage in Iowa" (Pitt 1988:13). Also, the Iowa SCS has completed its wetlands inventory, which will make their future determination process much stronger.

Two other Farm Bill provisions, the Conservation Reserve Program and the 1990 addition of the Wetland Reserve Program, are highlighted in the section on acquisition programs.

Groundwater Legislation In 1977 Iowa attempted to gain authority to administer a related federal law, the Safe Drinking Water Act of 1974. Maintaining clean supplies of drinking water has been a serious problem in Iowa, due to the combined effects of wetland losses and agricultural production practices. The natural water filtering and purification properties of wetlands were lost as they were extensively drained and altered. The application of pesticides and fertilizer have led to the existence of many contaminants in areas of groundwater recharge.

The state was granted administrative control from the Environmental Protection Agency over the Act's regulatory provisions for establishing minimum water quality standards and monitoring drinking water supplies. In 1981, Iowa

returned responsibility for enforcing these provisions back to the EPA due to financial problems. The eventual resolution of these problems led to the redelegation of regulatory authority to Iowa in 1982. Groundwater problems have continued to be a state concern, and led to the passage of the Iowa Groundwater Protection Act of 1987, the first of its kind in the nation. This Act is outlined in a later section.

State Wetland Law In 1990, the Iowa legislature passed the Wetlands Act, House File 2407. This Act amends Section 108 of the 1989 Code, and is now contained in chapter 1199 of the Iowa Code.

The law adds three new wetland definitions. First, wetlands "means an area of two or more acres in a natural condition that is mostly underwater or waterlogged during the spring growing season and is characterized by vegetation in hydric soils." Second, "protected wetlands" means types 3, 4, and 5 wetlands as described above. However, a protected wetland does not include land within a drainage or levee district or temporary wetlands caused when an agricultural drainage well has been plugged. Finally, "restored wetlands" means a wetland that was previously drained and cropped, but has been restored under an agreement with the DNR or other county, state, or federal agency or private conservation group.

Iowa law prohibits the draining of a protected wetland without first obtaining a permit from the DNR. The Department can only issue a permit under one of two conditions: the protected wetland is replaced by the applicant with a wetland of equal or greater value, or the protected wetland does not meet the criteria for continued designation as protected. This provision does not prevent a landowner from utilizing the bed of a protected wetland for pasture or cropland during periods of drought if there is no construction of dikes, ditches, tile lines, or building, and if the agricultural use does not result in drainage. A person who violates the permit requirement is subject to a civil penalty of not more than $500 for each day that the violation continues.

The law also requires the DNR to inventory the wetlands and marshes of the state and make preliminary designations as to which constitute protected wetlands. A map and a list of these areas must be kept on file with each county conservation board and county recorder. The DNR must notify landowners affected by these preliminary designations by certified mail; the landowner may then challenge the designation or ask that additional wetlands be protected. The law allows the Farm Mediation Service to provide for mediation between the DNR and affected landowners. A related wetland

provision authorizes a property tax exemption for areas designated as wetlands [Iowa Code section 427.1].

Summary The experience and intergovernmental relationships gained from past acquisition and regulatory efforts can be very helpful regarding the future range and scope of Iowa's authority over its wetlands. The following section explores related factors which will also impact Iowa's future role in wetland protection.

Other Factors

The key factors presented in this section are: related environmental legislation, the current political climate, the level of public awareness and support, the intensity of opinions on property rights, and local government activities.

The Groundwater Protection Act Groundwater protection became a major environmental concern in Iowa in the 1980s, due to the presence of contaminants from agricultural practices and the loss of wetlands and their natural functions of filtering and recharging groundwater supplies. This Act was created in 1987 to "prevent contamination of groundwater from point and non-point sources . . . to the maximum extent possible, and if necessary to restore the groundwater to a potable state, regardless of present condition, use, or characteristics" [H.F.631, Code of Iowa chapter 455(E.4)]. This act mandates that counties must adopt standards for both private water supplies and private sewage disposal facilities. Part of the funding available is for study of study alternative methods of protecting groundwater supplies; clearly, the natural functions of wetlands could play an important part in these research efforts.

Resource Enhancement and Protection (REAP) This program, established in 1989, has already been referred to because it has provided funding for wetland acquisition efforts. As noted, this Act was designed to provide $30 million annually for the purchase and protection of Iowa's natural resources. In addition to direct purchases of wetlands by the state, as in the Green Island project and Prairie

Pothole Joint Venture, the REAP program has evolved to encompasses many related programs, activities, and general objectives.

In early 1990, seventeen REAP assemblies took place throughout the state. All interested citizens were invited to participate, learn more about the program, and to present ideas and opinions about program policies and administration. Status reports were presented by state agencies, and activities of County Resource Enhancement committees were summarized. These county committees are required by the law to be formed in each of Iowa's 99 counties, and to prepare five-year county REAP plans. Opportunities for regional projects, and recommended changes in policies, programs, and funding were also addressed. Five delegates were chosen from each assembly to serve on the REAP congress. The tasks of the congress are to organize, discuss, and make recommendations to the governor, general assembly, and the DNR Natural Resource Commission regarding issues related to REAP.

The distribution of these state funds is based on the use six grant categories: Conservation Education, County Conservation Competitive Grants, City Park and Open Spaces Fund, Living Roadway Trust Fund, Historical Resource Grant and Loan Fund, and the Public/Private Cost-Sharing Fund

Since its inception, actual yearly budget allocations have been far below the original $30 million authorized. In its first year, REAP had a budget of $17.18 million. The total budget for fiscal year 1991 was $21 million, and money allocated to the program in 1992 was reduced to $10.6 million. The General Assembly has allocated $9 million for the program's operation in FY 1993.

The political climate These two Acts, together with the other programs mentioned, seem to indicate a strong concern for the environment by elected officials. However, Iowa wetland programs have had some opposition from private farmers and farm groups, who are concerned about the loss of agriculture production and the economic effects of this loss on local businesses. Gladfelter states that 1 acre of prime wetland can equal the production of an acre planted in corn, but the money is distributed to different industries, mainly in the form of increased revenues from hunters as they purchase local goods and services. Again, a major difficulty in any economic analysis is that many of a wetland's values are public or social goods and therefore difficult to quantify.

DNR Review Authority Recent action by the Iowa Environmental Protection Commission has placed the future of some state wetlands in jeopardy. In January 1992, the Iowa Environmental Commission "stripped state natural resources officials of the authority to review minor construction and maintenance projects if water resources might be endangered" (Hubert 1992:1M). The result of this action is that Iowa farmers, county officials, and others no longer need state permission to dig drainage ditches, dump dirt, or engage in related minor activities that may threaten small wetlands. State officials have routinely reviewed these minor projects since 1984, and were asking permission from the Commission to retain that authority and to increase the types of projects reviewed.

This action is viewed by officials of the DNR as a dangerous precedent, and a step backward in resource management in Iowa. Larry Wilson, Director of the DNR, is quoted as telling the Commission the following:

> I'm telling you, you made a big mistake. We needed that authority, and you conceded it. This commission was appointed to protect natural resources in this state, and when you make a decision like that you are not fulfilling those goals. (Hubert 1992:1M).

Property rights Another source of political conflict is the debate over the issue of government "takings" of private property. The fifth amendment to the U.S. Constitution states in part that the government shall not deprive any citizen of life, liberty, or property without just compensation.

Farm and environmental groups in the state have established opposing positions on this issue as it relates to wetland protection programs. In a 1991 article Merlin Plagge, president of the Iowa Farm Bureau Federation, agreed that the wetland provisions of the Clean Water Act and Farm Bills have led to a policy shift that has "turned into one of the largest efforts by government to control private land since the Manifest Destiny" (Plagge 1991:11A). Farmers advocate private ownership, control, and property rights. On the other hand, conservation groups argue that the government should protect and enhance natural resources for the benefit of all residents. The resolution of these opposing points of view is an important aspect of Iowa's future wetland protection efforts.

Local activities The following examples of local government activities in Iowa are taken primarily from articles in the *Des Moines Register* over the past three years.

In the fall of 1991, eighty acres of marsh and wet meadow, part of an area historically called Tieg's Marsh in northwest Story County, were purchased through a cooperative effort by the Story county chapter of Pheasants Forever, the national Ducks Unlimited organization, and the Iowa DNR. Primary funding for the project was provided by the REAP program; the area is now owned and managed by the DNR as a public recreation and wildlife habitat area.

According to a recent article by Larry Stone (1992:10D), Riverside Gardens in Monticello, Iowa, "isn't your ordinary city park." Located in the Maquoketa River floodplain, this city park includes a 2.5 acre restored marsh. When community boosters began planning the park in 1987, some residents were initially skeptical, fearing that the wetland would be dangerous to exploring children and a breeding ground for hordes of mosquitoes. After what is described as a two-year maze of engineering and permit applications, the city won a REAP grant for $75,000 to begin the marsh's development. The marsh was an instant success, as three springs filled the excavated area with water, and began to attract wildlife.

In August of 1992, the DNR and three private groups pledged $585,000 to develop a wetland nature area in the Wapsipinicon River corridor near Readlyn, Iowa. This project includes purchasing 925 flood-prone acres, of which 200 will be permanent wetlands. The area will be named for Aldo Leopold, who in the 1930s identified the river corridor as having one of the richest varieties of plants and animals in the state.

In the Waterloo-Cedar Falls area, a massive Chain of Lakes project is currently underway. This project involves the creation of large recreational lakes in George Wythe State Park along the Cedar River. These lakes are being created by the removal of dirt for fill material in nearby highway construction. Wetland development is a component of this plan, along with the construction of an environmental education center to be operated by the University of Northern Iowa.

Several communities in Iowa have tried to use the natural filtering properties of wetlands to treat their wastes. While not all efforts have been successful, officials in Granger and Wapello are very pleased with their results.

In 1985, Granger (pop. 700) was among the first communities in the country to try this approach (Washburn 1990:3). The treatment operation is a two-stage process. First, sewage is moved through two aerated lagoons, typical of most midwestern treatment facilities. In the second phase, the partially treated sewage is dumped into an artificial, two-cell wetland. Each cell is 3.2 acres in size and together can service the needs of about 900 people. In Iowa, the maximum number of suspended solids allowed for a treatment plant at the point of discharge is 120 ppm. The Granger system averages just 30 ppm in the summer months and only five to eight ppm in the winter. The marsh also removes ammonia nitrogen and fecal coliforms. Although the treatment marshes attract the usual multitude of wildlife associated with a wetland, the city has not developed the wetlands into a recreational area because ". . . mosquitoes, snakes and other pests attracted to the area might pose a threat to visitors" (Hubert 1992:5B).

Wapello, Iowa, (pop. 2,000) has recently created a wetland that acts as both a sewage treatment facility and a conservation and recreation area . Using part of its state grant funds from the REAP program, the city purchased 80 acres of cropland adjacent to its existing sewage lagoon. About 15 acres were converted into a wetland that receives partially treated sewage effluent. The water exiting from the wetland has tested well within safety standards, and the entire system passed inspection by state natural resources officials in May of 1992. Plans are underway to add a second 20-acre wetland to the system.

It should be emphasized that the diversion of municipal waste into natural, existing wetlands is not allowed in Iowa. However, the creation of artificial wetlands, or the restoration of drained wetlands, certainly provide a waste treatment option for communities to consider. Current mandates regarding the treatment of stormwater discharge also clearly relate to these efforts.

Summary

The information presented regarding Iowa's role in the implementation and administration of federal and state programs has many positive aspects. Iowa has extensive experience and expertise in managing its natural resources, including wetlands. It is indicated that state agencies have enjoyed positive, cooperative

relationships with other federal, regional, local, and private organizations to acquire and regulate wetlands in Iowa.

State, county, local, and private agencies in Iowa currently play a significant role in the protection of wetlands. To date the state's efforts have been focused primarily on acquisition, but state agencies also have considerable experience in the administration of regulatory programs. The above examples clearly illustrate that there is a growing public awareness of, and appreciation for, our wetland resources. Based on the findings of this chapter, more specific recommendations for the future role of Iowa state agencies in wetland protection programs are presented in the concluding chapter.

CONCLUSIONS AND RECOMMENDATIONS

The past history of wetlands in Iowa was fully explored in chapter five. It is estimated that Iowa once had over 2,300,000 acres of marsh and prairie potholes, but due to extensive draining, tiling, and stream channelization, only 35,000 acres remain. Early wetland protection efforts began in the 1930s, when authority and control of 65 lakes and marshes was given to the state in 1935. The federal Pittman-Robertson Act was passed in 1937, establishing an excise tax on sporting goods and ammunition. Part of the funds collected were allocated to Iowa agencies for acquisition of waterfowl habitat. In 1972 the creation of the Iowa duck stamp program also helped to save prairie marshes by using funds from waterfowl hunters to directly purchase and maintain wetland habitats.

When discussing the future of Iowa's wetlands ten years ago, Richard Bishop (1982:229) made the following comments:

> We must not lose what we have left. We still can protect and reclaim some wetlands. What is important now is that we protect what remains and secure the future of our natural resources. The general public . . . can urge lawmakers to fund sound conservation efforts to save our remaining wetlands. If money were available, drained basins could be bought, tile lines could be broken, and, with minor dirt work and a structure to control the water level, a marsh could be restored. If corridors could be bought along major scenic rivers in our state, a portion of these waterways could be preserved.

The Future Role of Iowa in Wetlands Protection

In 1988 the Iowa Wetlands Protection Plan was prepared to document wetland losses, to educate decisionmakers on wetland values, to provide a vehicle for improved communication, and to identify protective measures available. The Plan's section on recommended actions includes the following:

1) Acquire designated high-priority wetland complexes in Northwest Iowa, and in other areas as they become available.
2) Establish an active restoration program aimed at wetland areas in Northcentral Iowa which appear to offer the highest potential.
3) Maintain communications with drainage district interests to capitalize on opportunities of mutual benefit to all parties.

4) Inventory resources and prioritize actions to protect unique plant and animal species and communities in Iowa wetland areas.
5) Incorporate a water/wetlands element in statewide trail planning and development efforts.
6) Pursue fish and wildlife mitigation plan implementation on the Missouri River.
7) Continue to support wetland protection and restoration efforts in dealings with the Army Corps of Engineers and others relative to the channel maintenance and dredging program on the Mississippi River.
8) Measure and document the full range of wetland values and economic impacts.
9) Continue coordination with Federal, State, County, and private agencies and interest groups who share a concern with wetland protection in Iowa.

It is clear from the discussion of Iowa's wetland protection activities in chapter five that state efforts have moved in a positive direction to achieve these goals. The acquisition and regulatory efforts of state agencies clearly point to their increasing role in wetland protection. These efforts also indicate the growing public awareness and recognition that wetlands are a valuable natural resource.

Iowa's acquisition efforts include participation in the development of the Walnut Creek National Wildlife Refuge, the Wetland Restoration Program on lands enrolled in the Farm Bill's Conservation Reserve, the use of REAP funding for direct purchase of wetlands such as the Green Island Wildlife Area, and the many efforts of counties, local communities, and private groups. In addition, more Iowa farmers have signed intentions to participate in the 1992 Wetland Reserve pilot program than any other state involved. Over 750 farmers have submitted plans to the Soil Conservation Service in Iowa to enroll over 43,000 acres into the program, which exceeds the total number of current wetland acres in the state. The state should continue to aggressively pursue acquisition and restoration of wetlands, perhaps extending the Iowa Wetland Restoration Program to include those lands which will not be granted easements under the federal pilot program.

The state has also played a significant role in the administration of wetland regulatory programs. Although Iowa has not pursued assumption of Section 404 authority from the national government due to a lack of funding, state agencies do

have a vast amount of experience in implementing other wetland regulations. Iowa currently has authority over the provisions of the federal Safe Drinking Water Act of 1974, and in 1987 the state legislature passed the Iowa Groundwater Protection Act, the first of its kind in the nation. Iowa also has an extensive Section 401 program, which allows them to condition or deny federal permits which may result in harm to the state's water quality. Iowa has recently used its 401 authority to review the new general permit program of the Corps of Engineers, denying the use of several permits in the state.

Iowa's antidegradation policy declares clear goals regarding activities which may affect state water quality, stating in part that: "[i]t is the intent of the antidegradation policy to protect and maintain the existing physical, biological, and chemical integrity of all waters of the state." To be consistent with Iowa's water quality standards, any proposed activity modifying the integrity of state water must not cause damage to wildlife habitat or cause an overall degradation to the waterfowl and wildlife population and diversity. Exceptions to this standard are only allowable if full mitigation is provided by the applicant and approved by the Iowa DNR.

In 1990, the Iowa legislature passed the Wetlands Act, which outlines wetland designations, calls for a wetland inventory, and prohibits the draining of protected wetlands without first obtaining a permit from the DNR. Also, the state office of the Soil Conservation Service has completed its inventory, but is awaiting final disposition of the federal delineation manual before making wetland determinations on agricultural land.

In light of these positive accomplishments, the recent decision by the Iowa Environmental Protection Commission seems completely counterproductive. In January 1992, the Iowa Environmental Commission essentially stripped state natural resources officials of the authority to review minor construction and maintenance projects that may threaten small wetlands. State officials have routinely reviewed these minor projects since 1984. I fully concur with Larry Wilson, Director of the Iowa Department of Natural Resources, that this action is a mistake and sets a dangerous precedent. Hopefully, this action can be reversed or amended in the coming year, through legislative or administrative means.

Recommendations State agencies in Iowa currently play an important role in the protection of our wetland resources, and should fully explore the opportunities to improve and expand this role. Changes and refinements in federal wetland policy are likely to occur within the next few years which will have a significant impact on the role of states and intergovernmental relations. Based on Iowa's past experiences and current administrative wetland protection efforts, my primary recommendation is that Iowa should prepare for these upcoming changes by updating its 1988 Wetland Protection Plan along the guidelines of the EPA state grant program's State Wetland Conservation Plans. As noted previously, these Plans are intended to improve the effectiveness and efficiency of state government programs and private sector efforts to protect, restore, and create wetlands.

To accomplish this task, I strongly urge the Iowa DNR to seek a grant from the EPA to support the refinement and enhancement of Iowa's existing 1988 Plan. To date, Iowa is one of only two states which have not yet applied for this federal funding. Even if federal funding is sought, but not awarded to Iowa, there are other options for developing a statewide wetland protection plan, such as funding from the REAP program, legislative appropriations, and donations from private wetland conservation organizations.

Plan Development There are several existing mechanisms and institutional arrangements to help develop this plan, including the REAP congress, the county drainage districts, County Conservation Boards, local chapters of Pheasants Forever and Ducks Unlimited, the Farm Mediation Service, University Extension offices, and the use of video teleconferencing. To facilitate this process, Iowa should create a coordinating entity with representatives from federal, state, county, local, and private organizations to oversee and exchange information about all related wetland activities in Iowa. This group could be based on the model of the Wetlands Forum in Minnesota, which includes representatives from all levels of government and the private sector. The creation of this coordinating body is also in keeping with one of the recommendations of the Senior Advisory Group on Water Governance, which is to assist the state, tribal, and local governments to improve their water resources planning and management capabilities, and provide incentives for them to do so.

Plan Objectives The initial objectives of this plan could include those spelled out in the 1988 document, such as educating decisionmakers, documenting losses and trends, and providing a vehicle for improved communication among interested parties. The development of this plan can build on Iowa's own history of wetland protection, and include other objectives based partly on the experience of other states who have received funding from the EPA.

Plan Components The components of the plan should include, but are certainly not limited to:

1) current efforts of wetland mapping and classification,
2) summarizing past and current regulatory and acquisition efforts,
3) establishing or refining existing policy and program frameworks, and
4) promoting public awareness of wetland benefits and values.

Another important part of this plan should be devoted to a formal feasibility study of Iowa assumption of the Section 404 permit program, including future target dates for partial assumption of the program as it relates to wetlands, with the ultimate goal of assuming full state responsibility and regulatory authority over all waters within the state's boundaries.

Other possible areas of research could include:

1) a survey of affected agencies and groups to incorporate public input into desired future goals;
2) researching other states attempts to mitigate the adverse effects of urban development on wetlands, such as the concept of mitigation banking;
3) the use of conservation easements to protect wetlands;
4) measuring and documenting the full range of wetland values and economic impacts;
5) local roles in wetland protection programs; and
6) the creation of artificial wetlands for treatment of waste- and storm-water.

Many of these ideas for the development of a state wetlands plan would also help to achieve the goals of the 1992 REAP congress, such as promoting and supporting the REAP program, supporting conservation education, and studying the use of conservation easements.

The major result of this plan would be to update and build upon the recommended actions of the original document, and to set specific means and responsibilities for implementing these actions to preserve, protect, acquire, restore, or create wetlands in the state of Iowa.

In closing, I would like to paraphrase the conclusions reached by Richard Bishop in 1981. We can still protect and restore many of Iowa's wetlands. What is critical now is that we protect what remains, and prepare for the future acquisition and regulation of these precious natural resources.

The update and development of a statewide, comprehensive wetlands conservation plan can provide the means for Iowa to accomplish these goals.

AFTERWORD

The purpose of this afterword is to first explain the development of my personal interest in the subject matter, then present some general comments related to wetland protection and the federal government.

I originally became interested in studying the topic of wetland protection after attending the American Planning Association's Upper Midwest Regional Conference in the fall of 1988. I attended a session that introduced me to wetland-related provisions of the Clean Water Act and the 1985 Farm Bill. My initial research afterwards was simply an attempt to sort out and better understand the various objectives, roles, and responsibilities of the government agencies and private groups involved.

I decided to make wetland laws the topic of this thesis after reading a 1991 editorial in the *Des Moines Register* entitled "Wetlands: good idea tied in red tape." In his editorial, David Miller discussed how he attempted to develop about seven acres of wetlands on his farm in Jefferson County, Iowa. The main point of Miller's editorial is that even though he wished to restore wetlands, and was willing to put some of his own time and money into the project, he was discouraged from doing so due to the problems associated with meeting the requirements of the many involved agencies.

Since I had already done preliminary research into wetland laws, I could understand Miller's frustration. The involvement of, and approval needed by, so many different federal and state government agencies led me to agree that the current situation is indeed a regulatory morass. After sorting out the various pieces of the puzzle, the ultimate goals of this thesis have been to put the pieces back together in a coherent whole, using the larger context of intergovernmental relations.

The remainder of this afterword discusses some general conclusions and comments related to the future of wetland protection at the federal level.

The Federal Government

The coming year holds many opportunities for changes to, or refinements of, current federal wetland policy. During the course of this writing, this country's voters elected a new President. President-elect Bill Clinton has made a promise to the nation of change and reform, including restructuring parts of the federal bureaucracy. In an Associated Press article dated November 14, 1992, it is reported that Clinton's

transition team has promised an agency-by-agency review of executive branch operations. The article further states that Clinton may want to make a number of changes, particularly when he sees that agency duties overlap. This has obvious ramifications for the federal agencies involved in wetland protection, because the EPA, the Corps, the Fish and Wildlife Service, and the USDA all have various levels of authority and control over the nation's wetlands. Also, the inclusion of Al Gore as Vice-President and the upcoming appointments of new advisors, Cabinet Secretaries, agency heads, and federal judges has many conservationists hopeful that environmental issues will regain prominence as a national priority.

There are several other factors which will also affect federal wetland policy in the near future. The following sections outline some general conclusions and comments about these topics: the federal wetlands delineation manual, the National Wetlands Inventory project, the Wetland Reserve Program, reauthorization of the Clean Water Act, the EPA Wetland Division's state grant program, and a report from the Senior Advisory Group on Federal-State-Local Cooperation in Water Governance.

The Federal Interagency Wetland Delineation Manual As discussed in chapter two, the effort of Vice-President Quayle and the Council on Competitiveness to change this manual (by expanding the number of days of standing water required to classify a site as a wetland) sparked a great deal of conflict. In July 1992, the American Planning Association made the following related comments in a Plan Alert:

> Politics has played too large a role in the wetlands debate. It is time to put science back into our wetlands policy. Congress should commission a study of wetlands delineation by the National Academy of Sciences, an independent body of researchers. The Administration should not issue their proposed manual until after the release of this study.

On July 29,1992, the House of Representatives passed an appropriations bill which authorizes the EPA to commission this study from the National Academy of Science, and includes funding of $500 million for this purpose. This study should help put an end to the current controversy and provide a framework for wetlands policy based on science and ecology, not political considerations.

I strongly support the following recommendations for future revisions of the joint delineation manual made by William Sipple, chief ecologist in the EPA's wetlands division:

1) Wetland delineation manuals should be strictly technical documents that identify the universe of wetlands. Regulatory programs at the federal and state levels could then be designed around this standard, which would remain constant even though the regulations themselves might change.
2) It is time to move on with vigor from the multi-parameter (MPA) approach. (The current manual uses this approach, stating that the three technical criteria of hydrology, hydric soils, and hydrophytic vegetation specified are mandatory and must all be met for an area to be identified as a wetland.) Applying a strict MPA will in many instances produce incorrect results. Requiring all three criteria in all instances would at times be either impossible to accomplish, impractical, or even unnecessary. The MPA is in the initial stage in an evolving process, and we should build upon this process based on the MPA's application, field testing, and experience.
3) The delineation manual should instead rely heavily upon surrogate positive indicators of the technical criteria whenever appropriate. For example, if the hydrophytic vegetation or hydric soil materials were intentionally removed from a site, direct positive proof of these wetland characteristics could not be found. Under these circumstances, surrogate indicators such as prior site data, peat analysis, aerial photographs, and various soil and vegetation indicators should be used.
4) If a hydrology criterion is adopted, the requirement that it be met during the growing season should be abandoned. (Sipple 1992:5-6)

Ralph Tiner, of the Fish and Wildlife Service, supports the use of surrogate indicators in wetland determinations. Tiner believes that although the use of these indicators may appear to present potential regulatory loopholes, they are actually necessary tools for making practical, reasonable, and accurate wetland jurisdictional determinations (Tiner 1991a).

Tiner also concurs that the hydrology requirement should not be tied to the growing season, because many of the functions and values of wetlands occur independently of the growing season (Tiner 1991b). This is further supported by the

fact that during periods of drought, wetlands will remain completely dry throughout the growing season, as a natural part of a wetland's life-cycle. Dan Cohen, naturalist with the Buchanan County Conservation board in Iowa, states that "natural, periodic droughts have historically maintained our wetlands" (Cohen 1988:10A). These dry periods slow the accumulation of plant debris that would eventually fill the basin. When water returns to the site, the wetland is recharged with nutrients from the decomposed plants.

The study currently underway by the National Academy of Sciences must certainly address these issues. When completed, it will contribute to the achievement of the major goal and intent of the 1989 manual, which was to provide a single, consistent approach for identifying and delineating wetlands from a multi-agency federal perspective.

The National Wetlands Inventory Chapter two explained that the 1954 and 1974 wetland surveys undertaken by the U.S. Fish and Wildlife Service, and the subsequent reports of their findings, are the standard references used in this country for estimates of our original wetland acreages, wetland losses, and current wetlands status and trends. These documents and studies were solicited by the Service as part of its National Wetland Inventory project. Established in 1974, the major goal of the project is to generate scientific information on the characteristics and extent of wetlands in this country.

Two distinct types of information; status and trends reports, and detailed wetland maps, will achieve this goal. The reports will provide improved information for reviewing the effectiveness of existing federal programs and policies, identifying national or regional problems, and enhancing public awareness. The maps generated are intended for use by federal, state, and local agencies, as well as private organizations, for comprehensive resource management plans, environmental impact assessments, permit reviews, natural resource inventories, and wildlife surveys. As of June, 1992, this project has produced over 32,000 detailed wetland maps covering 72 percent of the coterminous United States, 22 percent of Alaska, and all of Hawaii, Puerto Rico, the Virgin Islands, and Guam (Fish and Wildlife Service 1992:2). The Service is scheduled to complete the mapping of the coterminous U.S. by 1998, as required by the Emergency Wetlands Resources Act of 1986.

It is clear that when this mapping effort is completed in the next five years, and is combined with the periodic updates of status and trends reports, the nation will have a strong database of ecological data to help make environmentally sound decisions regarding policy, planning, and management of our wetland resources.

The Wetland Reserve Program This reserve program was included in the 1990 Farm Bill, and was intended to preserve 1 million acres of wetlands by 1995, enrolling 200,000 acres each crop year. The reserve is designed to pay farmers fair market value to stop farming and restore wetlands on marshes that were previously drained, by using conservation easements of 30 years or more on privately owned land. Although the Congressional Budget Office authorized $220 million for this program, its implementation has been hampered by lack of funding from the House Appropriations Committee. The 1992 pilot program allocated $46.4 million for easements on 50,000 acres of farmland in eight states, including Iowa. Despite a large showing of interest in the pilot program, the 1992 Congress did not approve funding for the 1993 fiscal year. Supporters of the program asked that one-sixth of one percent of USDA appropriations be shifted from the Market Promotion program to fund the reserve. Instead, the market program received a full $150 million to subsidize overseas promotion of goods produced by major corporations. This action is consistent with the policies of the Bush administration, placing greater emphasis on economic concerns than on environmental considerations.

The Wetland Reserve Program can still significantly impact the future acquisition, restoration, and protection of this country's wetlands. The goal of preserving 1 million acres by 1995 is plainly out of reach, but if funding is restored we could still salvage 200,000 acres per year under this program. This would put a significant dent in the estimated continued loss of roughly 300,000 wetland acres annually. This program also addresses the concerns of farmers, who desire just compensation for taking their agricultural lands out of crop production. When the 1993 Legislature convenes, efforts by environmental groups and private citizens should concentrate on convincing our Senators and Representatives to fully fund this program.

The Clean Water Act It was noted in chapter four that the Clean Water Act was scheduled to be reauthorized in 1992. The controversy over the federal delineation manual was a major reason this was not accomplished. The reauthorization

of this Act is a major task facing the 1993 federal Legislative session. In preparing to revise the Act's Section 404 provisions, the EPA Wetlands Division commissioned a study to examine obstacles to state assumption of the 404 permit program, and to discover ways of removing these problems. The study found that the major obstacles faced by states are funding, political and public support, existing legislation, federal requirements, and other existing options. One of the primary recommendations of the study is that the EPA should take steps to facilitate a greater state role in wetlands protection. Clearly, the results of this study will affect the EPA's recommendations for changes in the Clean Water Act, and the role of the states in its implementation.

The EPA 's State Grant Program This program was outlined in chapter four. In 1990, Congress appropriated funding to the budget of the EPA specifically to support the development and advancement of state wetlands protection programs. The purpose of these grants is to support the initial development of state wetlands protection programs and the refinement and enhancement of existing programs. State agencies received a total of $1 million in 1990, $5 million in 1991, and $8.5 million in 1992, to support a wide variety of wetland-related activities, including Section 401 water certification, Section 404 assumption, wetland mapping and classification, mitigation banking, public education, and establishing policy and program frameworks. One emphasis of funded efforts is the development of State Wetland Conservation Plans, which are intended to improve the effectiveness and efficiency of state government programs and private sector efforts to protect, restore, and create wetlands.

The EPA will again make $8.5 million available for 1993. This current support of state wetland protection activities is another indication that the national government is attempting to facilitate states to have a greater role in managing their wetland resources. States should continue to take advantage of this opportunity.

Regional Management Another concept discussed in chapter four is the development of regional or basin-wide wetland management bodies. One emphasis of state initiatives in the EPA grant program has been the development of watershed and regional wetland management plans. These efforts advocate allowing federal, state, local, and private decisionmakers to cooperatively focus resources and establish priorities to address regional needs. The Advisory Group's report recommends that the

federal government should facilitate the establishment and effective operation of appropriate basinwide and interbasin cooperative bodies, which would transcend traditional jurisdictions and state boundaries.

At first glance, this concept appears too radical to overcome the organizational inertia of agencies already in place. However, a basinwide or watershed approach would allow for the protection and management of wetlands that are common to a region and share similar characteristics due to their natural evolution and development. The current Joint Ventures established under the North American Waterfowl Management Plan are an excellent example of this approach, establishing wetland administrative regions using natural and hydrological guidelines. The current regional offices of the EPA and the Corps do not utilize this common-sense approach, but are based instead on state boundaries. The administrative regions of the two agencies are not consistent, and in several cases do not cover the same states. I would further suggest that delineation criteria should be based on these regional watersheds, rather than attempting to develop criteria common to all wetlands in the nation. Clearly, the Florida Everglades are definitively and ecologically different than prairie potholes in the Midwest, or tundra wetlands in Alaska.

The Land Ethic Taken together, the evolution of the many wetland-related federal and state laws, the litigation they have produced, and the recommendations of the previous studies and reports all suggest that our society is approaching the type of relationship between humans and their environment advocated in the "Land Ethic" written in 1949 by Aldo Leopold in *A Sand County Almanac*. This ethic advocates living in harmony with nature, rather than trying to dominate and control our natural environment. It further recognizes the critical importance of the natural environment to our own health and well-being, and how these precious resources must be protected and managed for our own benefit and for future generations. This relationship is indicated in the second principle in the Advisory Group's report, which states that the development and use of the nation's diverse water resources have direct effects on ecosystems, and must be managed in a way to protect the long-term health of these ecosystems for the benefit of future generations while simultaneously meeting present water needs.

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